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ACTIVE IMMUNIZATION AGAINST TETANUS.

By E. A. NORTH and R. W. PATTERSON.

(From the Commonwealth Serum Laboratories, Melbourne.)

ACTIVE IMMUNIZATION with tetanus toxoid almost completely prevented tetanus in the British, Canadian, American (Miller *et alii*, 1949; Miller and Ryan, 1950) and Australian armed forces during the war of 1939-1945.

Only 32 cases of tetanus occurred amongst British, Canadian and American troops who had completed the basic courses of immunization (Miller and Ryan, 1950). Australian experience was similar. No definite case of tetanus was reported in our armed forces during the whole of the war.

On the other hand, the incidence of tetanus was high in the non-immunized German and Japanese armies. Fifty-three cases of tetanus occurred among American-held German prisoners of war in England during the period from September 7 to October 2, 1944. Although no American cases occurred, at least 473 cases of tetanus with 389 deaths were reported amongst civilian casualties during the fighting for Manila (Long and Sartwell, 1947).

In spite of this undoubted success in military practice, clarification on a number of points is needed before the use of tetanus toxoid can be put on a really firm basis under civilian conditions.

Questions to be considered include the following: (i) What antitoxic level in the blood serum is necessary to give protection against tetanus? (ii) What should constitute an adequate basic course of tetanus toxoid to produce satisfactory immunity? (iii) How often should a "booster" dose of toxoid be administered? (iv) What further prophylactic measures should be taken when a person previously actively immunized against tetanus is injured?

Protective Level of Tetanus Antitoxin in Serum.

Opinions differ as to what the protective level of antitoxin should be to offer immunity against tetanus. Bigler and Werner, (1941) state that "tetanus so rarely follows a prophylactic dose of 1500 U.S. units[1] of antitoxin that titres of antitoxin in the blood serum after this procedure should serve as an optimal level for protection". These authors followed the antitoxin titres in the serum of 54 children before and after the administration of 1500 units of antitoxin. Before injection the serum level was less than 0·003 unit per millilitre and was never more than 0·5 unit per millilitre during the first week. It fell to 0·2 unit during the second week and to 0·01 unit during the third week and then declined to 0·003 unit or lower in the next two weeks. They conclude that the level is not so high nor so lasting as that following immunization with toxoid.

Langton-Lockton (1952), reviewing the incidence of tetanus in Victoria between 1931 and 1950—during which period 254 cases were reported—found no record of its occurrence when antitoxin had been given at the time of injury or soon afterwards. The dosage is not stated, but it

[1] A dose of 1500 United States units is equivalent to 1500 units International Standard, 1950, and to 3000 units International Standard, 1928.

is likely that in many cases it would be less than 1500 units, and consequently the blood antitoxin levels would tend to be lower than those reported by Bigler and Werner.

Cooke and Jones (1943), as a result both of personal experience and of a review of the literature, consider that a titre of 0·01 to 0·1 unit of passively introduced antitoxin is probably required to protect human beings from tetanus, whilst an active immunity of 0·001 to 0·01 unit may be sufficient.

Bigler (1951), in a paper dealing solely with the results of active immunization, appears to accept a titre of 0·2 unit per millilitre as a certainly protective level, although he states that the consensus of opinion places the level between 0·01 and 0·1 unit of antitoxin per millilitre of blood serum.

Basic Immunization with Tetanus Toxoid.

During the second World War the prescribed courses for active immunization against tetanus in the British and United States armed forces differed. At first a course of two injections of fluid toxoid was ordered in the British Army. Early in 1941 a third dose was added, and later that year "routine annual booster" injections were advised (Boyd, 1946). The United States Army required three injections of fluid toxoid and a "routine stimulating" injection a year later. From April, 1941, until September, 1944, a stimulating dose of one millilitre was administered to men leaving for a theatre of operations if such departures took place more than six months after the basic series or the "routine stimulating" dose. In some theatres of war "annual stimulating" doses were also given. However, as a result of experience gained, the procedure followed in the later stages was to limit the injections to four unless the subject sustained an injury which might result in tetanus (Long and Sartwell, 1947).

Overall there were more cases of tetanus amongst British than amongst American troops; but when the schedule of dosage prior to trauma approached that of the United States Army, the morbidity rate was of a similar order—six British and six United States cases. The Canadian practice was to give three injections of fluid toxoid combined with typhoid vaccine. Only two cases of localized tetanus occurred (Miller and Ryan, 1950). Fluid toxoid was also used in the Australian Army, and no cases of tetanus were reported.

Only two cases of tetanus occurred in the United States Navy, which required a basic course of two injections of alum-precipitated toxoid and an annual reinjection. In addition a "booster" injection was given before a combat zone was entered (Hall, 1948).

It would seem from the experience of both the British Army and the United States Army that tetanus can be almost entirely eliminated if active basic immunization with three doses of fluid toxoid followed by a "stimulating" injection twelve months later is carried out—provided that adequate prophylactic treatment is given after trauma. This qualification is important and will be dealt with later.

The experience in the United States Navy suggests that a basic course of two injections of an alum-precipitated tetanus toxoid may be as effective as a basic course of three injections of fluid toxoid. This is supported by studies we have carried out.

With the help and cooperation of Dr. E. Forbes McKenzie, of the Victorian Health Department, 48 children, aged between seven and sixteen years, who had not previously received tetanus toxoid, were divided into four groups, each of 12 children and comparable as regards age and sex. All were given two doses each of 0·5 millilitre of toxoid as set out in Table I. The liquid toxoid (Group A) used resembled in all essentials that used in the British and Australian armies during the recent war. The purified tetanus toxoids adsorbed to aluminium phosphate (Groups B, C and D) each contained 10 milligrammes of the mineral carrier per millilitre.

Four weeks after the second injection the children were bled and aliquots of the serum from the subjects in each group were pooled and assayed for antitoxic content by the method of Glenny and Stevens (1938). It will be seen (Table I) that a total dosage in children of as little as 0·4 Lf.[1] of tetanus toxoid adsorbed to a mineral carrier (aluminium phosphate) is followed by an average serum antitoxin level which is far higher than that accepted by Bigler (1951) as definitely protective.

In another study eight young adult males at this institute were given two injections each of one millilitre of purified tetanus toxoid adsorbed to aluminium phosphate. The interval between the injections was six weeks. The toxoid was part of the same batch as that used in the Group B children (see Table I) in the previous study. No antitoxin was detected in the serum of the one subject tested prior to immunization. All were bled seventeen days after the second injection. The results are shown in Table II.

TABLE I.

Tetanus Antitoxin Levels in Serum of Groups of Children after Two Injections of Tetanus Toxoid.[1]

Group.	Number in Group.	Nature of Tetanus Toxoid.[2]	Strength. (Lf. per Millilitre.)[2]	Average Antitoxin Content of Serum, in Units per Millilitre, Four Weeks after Second Injection of Toxoid.
A	12	Liquid.	10 (approx.)	Between 0·04 and 0·1 unit.
B	11[3]	Purified and adsorbed to aluminium phosphate.	10	1·6 units.
C	12	Purified and adsorbed to aluminium phosphate.	2	1·0 unit.
D	12	Purified and adsorbed to aluminium phosphate.	0·4	Between 0·8 and 1·0 unit.

[1] Serum antitoxin titrations were not made prior to immunization. It is accepted that titratable amounts of antitoxin are not found in the serum of non-immunized persons.

[2] The volume of each dose was 0·5 millilitre and the interval between injections was six weeks.

[3] One of the original 12 children immunized was not available for bleeding.

The Response to "Booster" Doses of Tetanus Toxoid.

If it is assumed that a satisfactory active immunity has been established by giving a basic course of three injections of liquid toxoid or two injections of alum-precipitated toxoid folowed by a "routine stimulating" dose about one year later, a further problem arises. How often should a further "stimulating" or "booster" injection be given to maintain the immunity?

The experience in the United States Army during the war indicated that no further "booster" dose was necessary unless a subject was wounded. In one study group of 42 subjects who had last received toxoid two to five years previously, all but four still had what was regarded as an adequate protective level of antitoxin in their serum (0·1 unit per millilitre). However, Long and Sartwell (1947) make the following statement:

> In military practice reliance was not placed on a continuing state of immunity following immunization; but, rather, advantage was taken of the rapid rise in blood antitoxin levels which occurs soon after the administration of a stimulating dose.

This attitude appears sound. However, until recently there was little evidence as to how long after initial immunization an individual would respond to a "booster" dose. The work of Long and Sartwell (1947), of Peshkin (1945) and of McBryde and Poston (1946) indicated that a satisfactory response to a "booster" injection might be expected at least four or five years after basic immunization.

Bigler (1951) has now shown, in a study based on repeated tests on 300 infants and children, that protective levels of antitoxin follow "booster" injections given up to

[1] Lf.—limit of flocculation.

ten years after immunization. The response to the "booster" invariably takes place within seven days.

In 1951 we followed the response to a "booster" injection of toxoid on five adult males who had been previously immunized with fluid toxoid. The "booster" dose consisted of one millilitre of purified tetanus toxoid (10 Lf. per millilitre) adsorbed to aluminium phosphate. The relevant details are shown in Table III. Whilst these few observations may have little value by themselves, they certainly tend to confirm the findings of others. In one subject (D.W.) there was between one-tenth and one-fifth of a unit of antitoxin per millilitre in the serum nine years after the last previous dose of toxoid. The response to the "booster" dose was definite except in the case of one of us (E.A.N.), whose antitoxic level, however, was high prior to the injection. The rise in level of one subject (W.N.) immunized eleven years before the "booster" injection is particularly striking.

TABLE II.

Tetanus Antitoxin Levels in Young Adults after Two Injections of Purified Tetanus Toxoid Adsorbed to Aluminium Phosphate.

Subject Number.	Serum Antitoxin Level (Units per Millilitre) Seventeen Days after Second Dose of Toxoid.[2]
1[1]	More than 0·625.
2	More than 0·625.
3	More than 0·625.
4	Between 0·1 and 0·5 unit.
5	More than 0·625.
6	More than 0·625.
7	More than 0·625.
8	More than 0·625.

[1] No antitoxin was demonstrated in the serum of this subject prior to immunization.

[2] The largest amount tested for was 0·625 unit per millilitre. In each case the strength of the toxoid was 10 Lf. per millilitre, the course consisted of two doses each of one millilitre, and the interval between injections was six weeks.

Our observations were made before we had access to Bigler's recent paper (Bigler, 1951), but it seems likely that a protective level of antibody would have been found by the seventh day in each case.

Thus, there is evidence that a satisfactory antibody response will rapidly follow the injection of a "booster" dose of toxoid many years after an adequate initial course of immunization. If this stimulus can be regularly applied at the time of reception of a wound—as in military practice—further "routine stimulating" doses of toxoid appear to be unnecessary except after a long interval.

It is widely assumed that the release of toxin in a wound infected with *Clostridium tetani* will provide an adequate stimulus as does the "booster" dose of toxoid. Unfortunately there is little experimental evidence either in animals or in man to support this view (Jones and Jamieson, 1936; Zuger *et alii*, 1942; Cooke and Jones, 1943). Therefore in civilian practice, in which most cases occur after minor injuries perhaps not even seen by a doctor (Pratt, 1945; Langton-Lockton, 1952), reliance must be placed largely on the level of serum antitoxin at the time of possible infection.

Some authorities (Miller and Ryan, 1948) recommend the giving of biennial "booster" doses to maintain a protective level. This seems hardly practicable as a routine civilian measure. Evidence such as that presented by Evans (1943) and Long and Sartwell (1947), supported by our own findings, suggests that perhaps five years might be a reasonable interval between "routine booster" injections for both children and adults.

Procedure following Injury of a Person Previously Actively Immunized Against Tetanus.

On the evidence discussed above, a person with a trivial wound who has had toxoid up to at least five years previously should run little risk of contracting tetanus even if he is not examined by a doctor.

However, if an injured person who has previously been immunized with toxoid is brought for treatment, what further specific measures against tetanus should be taken? The first requirement is a record of his having been immunized. Some form of certification comparable with the army pay book method is essential if the full advantages of active immunization are to be gained. During the last war an international difference of opinion existed in regard to the management of wounded individuals who had previously been actively immunized.

The Americans gave a "wound booster" of tetanus toxoid but no antitoxin, relying on the rapid rise in blood antitoxin level which follows reinjection of toxoid (Long and Sartwell, 1947). The Canadians, in general, followed the American practice. The results were good. The Australian Army practice in the event of a war wound was to give a "booster" dose of toxoid if the soldier's pay book was available, with written signed evidence of two injections of toxoid—otherwise antitoxin was given.

TABLE III.

Serum Antitoxin Levels Prior to and After a "Booster" Dose of Tetanus Toxoid (Purified and Adsorbed to Aluminium Phosphate.)

Subject.	Period Since Primary Immunization. (Years.)	Previous "Booster" Dose.	Serum Antitoxin Levels. (Units per Millilitre.)	
			Before "Booster" Dose.	Eleven Days After "Booster" Dose.
E.A.N.	9	3 months previously.	Between 2 and 10 units.[1]	Between 2 and 10 units.[1]
R.W.P.	12	3 months previously.	Between 0·02 and 0·1 unit.	0·5 unit.
D.W.	9	Within 12 months of primary immunization.	Between 0·1 and 0·2 unit.	More than 2 units.
W.N.	11	Within 12 months of primary immunization.	Less than 0·02 unit.	More than 0·5 unit.
S.S.	3	Within 12 months of primary immunization.	Between 0·1 and 0·2 unit.	More than 2 units.

[1] Titration was for range two to ten units without intermediate steps. There might therefore be a rise after the "booster" dose which is not shown by the figures.

On the other hand, the British practice was to give a prophylactic dose of antitoxin on the grounds that it afforded some protection for the poor reactors to toxoid, or for those whose circulating antitoxin had dwindled in the course of time, none of whom could benefit immediately from toxoid (Boyd, 1946).

In favour of the British view is the fact that cases of tetanus that did occur in actively immunized troops had short incubation periods due to heavy infection, and as was pointed out by Miller, Ryan and Beard (1949), only six of the 22 British cases of tetanus occurred in men who had received four or more injections of toxoid, and none of these six died.

Both the British and the American practices following reception of wounds have proved effective in reducing the case fatality rate among the few cases which occurred (Miller and Ryan, 1950). However, the American practice of giving toxoid is to be preferred because of the risk of some allergic manifestation following the repeated injection of serum. Even with antitoxic serum refined by enzymatic (peptic) digestion, this danger is by no means entirely eliminated.

However, in the case of wounds in which the danger of tetanus is considerable, it would seem reasonable to inject both antitoxin and toxoid to afford immediate as well as prolonged protection, provided that the antitoxin does not interfere with the secondary response to the toxoid. Miller and Ryan (1950) have now clarified this point. They have shown that when antitoxin and toxoid are injected into opposite extremities of previously actively immunized

subjects, the initial rise in titre due to the injected antitoxin is followed a few days later by a higher and prolonged secondary increase. If the antitoxin and toxoid are mixed in the same syringe, no such secondary response occurs.

Summary and Conclusions.

The evidence in favour of active immunization against tetanus under military conditions is overwhelming. A highly conservative estimate of the serum antibody level necessary to give protection against tetanus may be taken as 0·1 to 0·2 unit per millilitre. Such a level has been found in the blood of subjects up to at least nine years after an adequate initial immunization which includes a "routine stimulating" injection of toxoid after twelve months.

On the evidence considered in this paper, the following principles should form the basis of a sound procedure regarding active immunization in civilian practice:

1. A basic course of three injections of fluid toxoid or of two injections of a toxoid containing a mineral carrier should be given.

2. These injections should be followed by a "routine stimulating" injection of toxoid about twelve months later.

3. No further "stimulating" (booster) dose of toxoid should be necessary for at least five years except in the event of injury.

4. After minor injuries the subject should immediately receive an "emergency booster" dose of toxoid if the injury occurs six months or more after completion of the basic course or six months or more after a "stimulating" dose.

5. In the case of severe wounds, especially those of the deep penetrating type, and when there is severe shock, both toxoid and antitoxin should be given immediately in separate syringes and at separate sites.

6. If there is any doubt as to whether a patient has been adequately actively immunized, antitoxin should always be given.

7. When a person has been actively immunized against tetanus, he (or the guardian in the case of a child) should be given a certificate to that effect.

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References.

BIGLER, J. A. (1951), "Tetanus Immunization—A Ten Year Study", *Am. J. Dis. Child.*, 81 : 226.

BIGLER, J. A., and WERNER, M. (1941), "Active Immunization against Tetanus and Diphtheria in Infants and Children", *J.A.M.A.*, 116 : 2355.

BOYD, J. S. K. (1946), "Tetanus in the African and European Theatres of War", *Lancet*, 1 : 113.

COOKE, J. V., and JONES, F. G. (1943), "The Duration of Passive Tetanus Immunity and its Effect on Active Immunization with Tetanus Toxoid", *J.A.M.A.*, 121 : 1201.

EVANS, D. G. (1943), "Persistence of Tetanus Antitoxin in Man Following Active Immunization", *Lancet*, 2 : 316.

GLENNY, A. T., and STEVENS, M. F. (1938), "Laboratory Control of Tetanus Prophylaxis", *J. Roy. Army M. Corps.*, 70 : 308.

HALL, W. W. (1948), "The U.S. Navy's War Record with Tetanus Toxoid", *Ann. Int. Med.*, 28 : 298.

JONES, F. G., and JAMIESON, W. A. (1936), "Studies in Tetanus Toxoid: III. Antitoxic Response in Guinea Pigs Immunized with Tetanus Alum-precipitated Toxoid followed by Tetanus Spores", *J. Bact.*, 32 : 33.

LANGTON-LOCKTON, P. (1952), "The Incidence of Tetanus in Victoria in the Years 1931-1950", *Health Bull.*, Number 107, page 26.

LONG, A. P., and SARTWELL, P. E. (1947), "Tetanus in the United States Army in World War II", *Bull. U.S. Army M. Dept.*, 7 : 371.

McBRYDE, A., and POSTON, M. A. (1946), "Immunization with Tetanus Toxoid. The Persistence of Antitoxin and the Effect of Stimulating Doses of Alum-precipitated Tetanus Toxoid after a Five Year Period", *J. Pediat.*, 28 : 692.

MILLER, J. J., junior, and RYAN, M. L. (1948), "Immunization with Combined Diphtheria and Tetanus Toxoids (Aluminium Hydroxide Adsorbed) Containing H. Pertussis Vaccine. II. The Duration of Serologic Immunity", *Pediatrics*, 1 : 8.

MILLER, J. J., junior, and RYAN, M. L. (1950), "Combined Active-Passive Re-immunization against Tetanus in Previously Immunized Individuals: Experimental and Clinical Evidence", *J. Immunol.*, 65 : 143.

MILLER, J. J., junior, RYAN, M. L., and BEARD, R. R. (1949), "The Speed of the Secondary Immune Response to Tetanus Toxoid with a Review of the War Reports and Observations on the Simultaneous Injections of Toxoid and Antitoxin", *Pediatrics*, 3 : 64.

PESHKIN, M. M. (1945), "Immunity to Tetanus Induced by a Third Dose of Toxoid Four Years After Basic Immunization. Based on a Study of Twenty-five Allergic Children", *Am. J. Dis. Child.*, 69 : 83.

PRATT, E. L. (1945), "Clinical Tetanus: Study of Fifty-six Cases with Special Reference to Methods of Prevention and Plan for Evaluation of Treatment", *J.A.M.A.*, 129 : 1243.

ZUGER, B., GREENWALD, C. K., and GERBER, H. (1942), "Tetanus Immunization: Effectiveness of the Stimulating Dose of Toxoid under Conditions of Infection", *J. Immunol.*, 44 : 309.

SIMULTANEOUS IMMUNIZATION OF INFANTS AGAINST DIPHTHERIA AND TETANUS.

By E. A. NORTH and R. W. PATTERSON.

(From the Commonwealth Serum Laboratories, Melbourne.)

A RECENT survey in a United States city by Cowgill (1952) showed that approximately two-thirds of all children there had been immunized against both diphtheria and tetanus before they were one year old and an even greater proportion against pertussis, but it is not stated what proportion of these children were immunized against all three simultaneously. It would appear, however, from the many recent communications on the subject (Miller and Ryan, 1948; di Sant 'Agnesse, 1950; Sauer and Tucker, 1950; Murray, 1950; Tyson *et alii*, 1950; Peterson and Christie, 1951*a*; Christie and Peterson, 1951; Peterson and Christie, 1951*b*; Wilson, 1951) that the present trend in both the United States of America and Canada is towards simultaneous immunization against all three infections.

This paper will be limited to the consideration of combined diphtheria and tetanus antigens. The addition of pertussis vaccine to diphtheria toxoid or to a mixture of diphtheria and tetanus toxoids is still a contentious subject in Australia (Keogh, 1952) and will be dealt with separately.

The advantages of active immunization against diphtheria are generally accepted. However, differences of opinion exist as regards the optimum age at which the diphtheria toxoid should be used. Until about twenty years ago it was thought that very young infants generally were incapable of forming antibody on account of physiological immaturity (Baumgartner, 1934). This view is no longer accepted, and it is now believed that the reason that a proportion of young babies respond poorly to the usual doses of diphtheria toxoid is that their serum contains passively transferred maternal antitoxin which interferes with the response to the antigen. In a few babies this antitoxin is not entirely eliminated at the age of six months (Vahlquist, 1949; Barr *et alii*, 1950).

McGuinness (1952) considers, however, that the fact that infants possessing maternally conferred antibody do not respond well to diphtheria toxoid given early is of academic rather than of practical interest. They are immune whilst carrying maternal antibody, and according to McGuinness, their antitoxin levels will rise sharply with a single stimulating (booster) dose of toxoid some months later. Di Sant 'Agnesse (1950) and Christie and Peterson (1951) find that a high proportion of susceptible infants respond well to diphtheria toxoid given in the second and third months of life. Christie and Peterson (1951) find, however, that young babies do not respond with as high titres of antibody as do older children, and that passive immunity appears to be more significant than age in modifying the response. These authors nevertheless conclude that the capacity of very young infants to respond to diphtheria toxoid is such that they may be successfully immunized and the immunity maintained provided they receive a "booster" injection ten to fifteen months later.

Bousfield (1949) found that infants aged from three to five months could be successfully immunized with two injections of diphtheria prophylactic, PTAP, 100% being

"Schick-negative" one year later; but he now (Bousfield, 1952) tentatively suggests, in view of the finding of Barr *et alii* (1950) and of Vahlquist (1949), that six months may be the proper age at which to commence diphtheria immunization.

Pearlman (1952) does not favour the present American trend towards earlier diphtheria immunization, quoting statistics to show that less than 9% of diphtheria deaths in Canada occur in babies up to one year old. Those who favour deferment of diphtheria immunization until the second six months of life argue that the stimulus should be applied at the time when the child most needs protection and when it will respond better to the antigen.

Not only has it been shown that young babies can be successfully immunized against diphtheria (Bousfield, 1949; di Sant 'Agnesse, 1950; Sauer and Tucker, 1950; Christie and Peterson, 1951), but there is evidence that one dose of Holt's (1947) purified diphtheria toxoid adsorbed to aluminium phosphate (PTAP) is an excellent "booster". Crowe (1950) injected 621 school children in Melbourne with 0·5 millilitres of diphtheria prophylactic, PTAP. These children had a history of previous immunization (not with PTAP), but all had reverted to "Schick-positive" status. Seven months after the "booster" injection with PTAP, only three—less than 0·5%—were "Schick-positive".

It would therefore seem that if a "booster" injection is given about twelve months later, primary immunization against diphtheria may well be started at an age less than six months, if there is a special indication for doing so.

Current American opinion regarding active immunization of children against tetanus is well summed up by McGuinness (1952) as follows:

> Tetanus toxoid provides one of the most effective immunizing agents yet developed. It is well tolerated and the response in young infants is excellent. Everyone should be actively immunized against tetanus.

McGuinness's view that the response in young infants to tetanus toxoid is almost uniformly good is borne out by many reports (Bigler and Werner, 1941; Miller and Ryan, 1948; Sauer and Tucker, 1950; Murray, 1950; di Sant 'Agnesse, 1950; Peterson and Christie, 1951*b*; Tyson *et alii*, 1950). The consistently good response may be due partly to the fact that titratable amounts of antitoxin are not found in the serum of American children who have not been artificially immunized (Bigler and Werner, 1941; Tyson *et alii*, 1950). On the other hand, Ten Broeck and Bauer (1922-1923) found that in China many adults had titratable amounts of antitoxin in their blood, and that placental transmission of antitoxin from mother to child occurred. The serum antitoxin found in adults was associated with the presence of *Clostridium tetani* in the fæces. It has also been shown that the newborn infant can be protected against tetanus by active immunization of the expectant mother (McKahnn and Kapnick, 1938; Cohen *et alii*, 1951). It can only be assumed, therefore, that the difference between serum antitoxin levels in Chinese as compared with those in Americans is due to differences in hygiene in the two countries.

In all the foregoing studies with combined antigens in the United States of America, either alum-precipitated or aluminium hydroxide adsorbed toxoids were preferred to fluid toxoids. It has been shown both in England and in Australia (Holt and Bousfield, 1949; McKenzie, 1950) that purified diphtheria toxoid adsorbed to aluminium phosphate (PTAP) is a particularly effective antigen, only two doses being necessary to produce regularly a basic immunity. There is also strong evidence that two injections either of alum-precipitated tetanus toxoid (Hall, 1948) or of tetanus toxoid purified and adsorbed to aluminium phosphate (North and Patterson, 1953) are at least as effective as three injections of fluid tetanus toxoid.

In Victoria there are now approximately as many deaths from tetanus as from diphtheria (Langton-Lockton, 1952) and many of them follow trivial injuries in children. In Queensland during the past five years there has been an average of 20 tetanus deaths annually, compared with 11 deaths from diphtheria (Fryberg, 1952).

Pratt (1945), of the Department of Pediatrics, Harvard Medical School, considers that active immunization with tetanus toxoid is the only way to reduce substantially the mortality from tetanus in children, because 80% of cases follow trivial injuries which the doctor does not see, and probably the same holds true in Australia (Langton-Lockton, 1952).

In view of the apparent success of simultaneous immunization with antigens containing a mineral carrier in America, and of the need to protect children against both tetanus and diphtheria in Australia, it was decided to study the antibody response in a small group of Victorian children to combined diphtheria and tetanus toxoids purified and adsorbed to aluminium phosphate.

Preparation of Immunizing Agent.

The diphtheria component was diphtheria toxoid purified and adsorbed to aluminium phosphate, prepared as previously described (Patterson and North, 1950). It contained 50 Lf.[1] of diphtheria toxoid and 10 milligrammes of aluminium phosphate per millilitre.

The tetanus component was prepared by a modfication of Raynaud's (1951) method.

Briefly, *Cl. tetani* was grown in a peptic digest of meat broth. At the end of a growth period of twelve days the organisms were separated from the bulk of fluid and suspended in physiological saline containing calcium penicillin. The suspension was left at 0° C. for four or five days. The extracted toxin was almost free from broth protein. It was detoxicated by (neutral) 0·4% formalin in two to three weeks at 35° C. Further purification was effected by ultra-filtration through porous ceramic candles coated with collodion. The toxoid was next brought to small volume and tested for toxicity, flocculation unitage, total nitrogen and antigenicity.

The purified toxoid was readily adsorbed on aluminium phosphate. The latter was prepared according to the method of Holt (1947). The final product contained 10 Lf. of tetanus toxoid and 10 milligrammes of aluminium phosphate per millilitre. The antigenicity tests complied with the United States of America Federal Health Service Regulations for adsorbed antigens.

To make the combined diphtheria and tetanus antigen, equal volumes of the diphtheria and the tetanus components were mixed. The combined prophylactic (C.D.T.) contained 25 Lf. diphtheria toxoid together with 5 Lf. of tetanus toxoid and 10 milligrammes of aluminium phosphate per millilitre.[2]

Safety and antigenicity tests were performed on this final combined antigen as well as on the components separately.

Clinical Trial with Combined Diphtheria and Tetanus Toxoids Purified and Adsorbed to Aluminium Phosphate (C.D.T.).

Ten infants at a babies' home whose ages ranged from six to eighteen months and who had not previously been immunized against diphtheria or tetanus were Schick-tested. All reacted to the Schick-test toxin. Their sera were not assayed for diphtheria or tetanus antitoxin prior to injection with C.D.T. The collection of blood from babies is a tedious procedure, and the average diphtheria antitoxic content of the blood of "Schick-positive" individuals is less than 0·005 unit per millilitre. It was assumed further (Bigler and Werner, 1941; Tyson *et alii*, 1950; Patterson, 1952) that the tetanus antitoxic content was less than 0·003 unit per millilitre.

All the babies were given two subcutaneous injections each of 0·5 millilitre of C.D.T. spaced six weeks apart. A small subcutaneous nodule developed at the site of injection together with a mild erythema of the skin. The nodule persisted for some weeks. No general reaction was noted.

[1] Lf.—limit of flocculation.

[2] The relative amounts of diphtheria and tetanus toxoids necessary to ensure adequate response to both was determined beforehand by animal experiment (Lee, Barr and Llewellyn-Jones (1953), *Brit. J. Exper. Path.*, 34 : 12).

TABLE I.

Results of Immunization of Infants with Combined Diphtheria and Tetanus Toxoids, Purified and Adsorbed to Aluminium Phosphate (C.D.T.).

Number of Infants.	Age of Infants.	Schedule of Dosage of C.D.T.	Schick Status.		Average Serum Antitoxic Content 19 Days after Second Injection.	
			Before C.D.T.	Six Weeks after C.D.T.	Diphtheria.	Tetanus.
10	6 to 18 months.	Two subcutaneous injections, each of 0·5 millilitre, spaced six weeks apart.	All "positive".	All "negative".	1 unit per millilitre.	1·6 units per millilitre.

Nineteen days after the second injection of C.D.T. the babies were bled from the femoral vein, and aliquots of their sera were pooled and assayed for diphtheria antitoxin by the method of Glenny and Llewellyn-Jones (1931), and for tetanus antitoxin by the method of Glenny and Stevens (1938). Later the babies were again Schick-tested. The details are shown in Table I.

It will be noticed that after immunization all children changed from "Schick-positive" to "Schick-negative" status. Their average diphtheria and tetanus serum antitoxic levels—namely, one unit per millilitre and 1·6 units per millilitre respectively—were far higher than those necessary to offer protection against both infections (Vahlquist and Hogstedt, 1949; North and Patterson, 1952). It was thought that the results amply confirmed those of the American workers cited above.

Discussion.

Two injections of diphtheria toxoid, purified and adsorbed to aluminium phosphate (PTAP) result in a Schick conversion rate in children of almost 100% (McKenzie, 1950), whilst as little as a total of 2 Lf. of tetanus toxoid similarly treated given in two doses spaced six weeks apart is followed by an average serum tetanus antitoxin level of one unit per millilitre (North and Patterson, 1952). In view of these facts and of the glowing reports of American authors on combined immunization, the satisfactory antibody response to the combined prophylactic (C.D.T.) was not unexpected. Further, on account of the comparative purity of both toxoids, disagreeable side effects have, as anticipated, been almost entirely absent.

In Australia, immunization of babies and pre-school children against diphtheria is encouraged, and the diphtheria prophylactic PTAP is widely used for this purpose. As tetanus probably kills at least as many people here as does diphtheria, and as the only way substantially to lower the tetanus mortality is by active immunization (Pratt, 1945), the recommendation of McGuinness (1952) that every child be immunized against tetanus should be implemented in Australia.

Tetanus immunization is particularly well suited to be carried out simultaneously with diphtheria immunization. Very young babies react better to tetanus toxoid than they do to diphtheria toxoid. However, if, as some authorities believe, it is sounder to defer diphtheria immunization until about the seventh month, tetanus immunization too can safely be left till then. Apart from *tetanus neonatorum*, the disease is rare until the child reaches the ambulatory stage.

A routine stimulating dose of tetanus toxoid about twelve months after basic immunization is almost universally recognized as essential (North and Patterson, 1952). There is little doubt that a routine stimulating or "booster" dose of diphtheria toxoid would reduce still further the small number of cases of diphtheria that still occur in children who have been previously immunized.

If children are given two injections of aluminium phosphate adsorbed diphtheria and tetanus toxoids (C.D.T.) starting at the age of about six months, a routine stimulating or "booster" dose about twelve months later, and a further "booster" of C.D.T. when they enter school, they should be adequately protected against both infections until they are about ten years old.

Finally it should be stressed that when the immunization of a baby against tetanus is complete, a certificate to this effect should be given to the parent. Otherwise one of the benefits of active immunization—the avoidance of the necessity of giving antitoxin after comparatively minor injuries with the attendant risk of anaphylactic reaction—will be lost.

Summary and Conclusions.

1. Recent overseas literature on simultaneous immunization against diphtheria and tetanus is discussed.

2. There is general agreement that the immunity response to tetanus toxoid is almost universally good even in the very young infant.

3. The response to diphtheria toxoid is not so good during the first six months of life as it is later.

4. However, the present trend in the United States of America and Canada is towards simultaneous immunization beginning at the age of three or four months, followed by a "booster" dose of both diphtheria and tetanus toxoids twelve months later.

5. A small clinical study on simultaneous immunization by the use of combined diphtheria and tetanus toxoids, purified and adsorbed to aluminium phosphate (C.D.T.) was carried out.

6. Two injections into babies resulted in highly protective levels of both diphtheria and tetanus antitoxin in the serum. No untoward reactions either local or general were noted.

7. Reasons are advanced why simultaneous immunization against diphtheria and tetanus should become standard practice in Australia.

8. Adequate protection can be obtained with two doses of the combined prophylactic and maintained by routine "booster" doses.

Acknowledgement.

We wish to acknowledge the helpful advice given to us by Dr. E. V. Keogh.

References.

BARR, M., GLENNY, A. T., and RANDALL, K. J. (1949), "Concentration of Diphtheria A.T. in Cord Blood and Rate of Loss in Babies", *Lancet*, 2 : 324.

BAUMGARTNER, L. (1934), "The Relationship of Age to Immunological Reactions", *Yale J. Biol. & Med.*, 6 : 403.

BIGLER, J. A., and WERNER, M. (1941), "Active Immunization against Tetanus and Diphtheria in Infants and Children", *J.A.M.A.*, 116 : 2355.

BOUSFIELD, G. (1949), "Diphtheria Prophylaxis in Very Young Infants", *Lancet*, 1 : 1100.

BOUSFIELD, G. (1952), "A Future for Combined Diphtheria and Whooping Cough Prophylaxis", *M. Officer*, 87 : 265.

CHRISTIE, A., and PETERSON, J. C. (1951), "Immunization in the Young Infant Response to Combined Vaccines V.", *Am. J. Dis. Child.*, 81 : 501.

COHEN, P., SCHNECK, H., and DUBOW, E. (1951), "Prenatal Multiple Immunization", *J. Pediat.*, 38 : 696.

COWGILL, D. O. (1952), "The Level of Immunization of Preschool Children in Wichita", *Am. J. Pub. Health*, 42 : 32.

CROWE, E. J. (1950), Unpublished.

DI SANT 'AGNESSE, P. A. (1950), "Simultaneous Immunization of New-born Infants against Diphtheria Tetanus and Pertussis", *Am. J. Pub. Health*, 40 : 674.

FRYBERG, A. (1952), Personal communication.

GLENNY, A. T., and LLEWELLYN-JONES, M. (1931), "The Intracutaneous Method of Testing Diphtheria Toxin and Antitoxin", *J. Path. & Bact.*, 34:143.
GLENNY, A. T., and STEVENS, M. F. (1938), "The Laboratory Control of Tetanus Prophylaxis", *J. Roy. Army M. Corps*, 70:308.
HALL, W. N. (1948), "The U.S. Navy's War Record with Tetanus Toxoid", *Ann. Int. Med.*, 28:298.
HOLT, L. B. (1947), "Purified Precipitated Diphtheria Toxoid of Constant Composition (PTAP)", *Lancet*, 1:282.
HOLT, L. B., and BOUSFIELD, M. D. (1949), "PTAB. The Present Position", *Brit. M. J.*, 1:695.
KEOGH, E. V. (1952), M. J. AUSTRALIA, 2:570.
LANGTON-LOCKTON, P. (1952), "The Incidence of Tetanus in Victoria in the Years 1931-1950", *Health Bull.* Number 107, page 26.
McGUINNESS, A. C. (1952), "Review of Current Trends in Active and Passive Immunization", *J.A.M.A.*, 148:261.
McKENZIE, E. F. (1950), "Purified Toxoid Aluminium Phosphate (PTAP). Report on Australian Field Trials", M. J. AUSTRALIA, 2:473.
McKHANN, C. F., and KAPNICK, I. (1938), "Immunity and Susceptibility to Disease in Early Infancy", *J. Pediat.*, 13:907.
MILLER, J. J., JUNIOR, and RYAN, M. L. (1948), "Immunization with Combined Diphtheria and Tetanus Toxoids (Aluminium Hydroxide Adsorbed) Containing H. Pertussis Antigen. II. The Duration of Serologic Immunity", *J. Pediat.*, 1:8.
MURRAY, R. (1950), "Simultaneous Immunization against Diphtheria, Tetanus and Pertussis", *Am. J. Pub. Health*, 40:686.
NORTH, E. A., and PATTERSON, R. W. (1953), "Active Immunization against Tetanus", M. J. AUSTRALIA, 1:797.
PATTERSON, R. W. (1952), unpublished observations.
PATTERSON, R. W., and NORTH, E. A. (1950), "Modern Trends in Diphtheria Prophylaxis", M. J. AUSTRALIA, 2:470.
PEARLMAN, L. N. (1952), "Early Immunization—Its Possible Influence on Canadian Mortality Figures", *Am. J. Dis. Child.*, 84:11.
PETERSON, J. C., and CHRISTIE, A. (1951*a*), "Immunization in the Young Infant. Response to Combined Vaccines I-IV", *Am. J. Dis. Child.*, 81:483.
PETERSON, J. C., and CHRISTIE, A. (1951*b*), "Immunization in the Young Infant. Response to Combined Vaccines VI-X", *Am. J. Dis. Child.*, 81:518.
PRATT, E. L. (1945), "Clinical Tetanus: Study of 56 Cases with Special Reference to Methods of Prevention and Plan for Evaluation of Treatment", *J.A.M.A.*, 129:1243.
RAYNAUD, M. (1951), *"Extraction de la toxine tétanique à partir des corps microbiens"*, *Ann. Inst. Pasteur*, 80:356.
SAUER, L. W., and TUCKER, W. H. (1950), "Simultaneous Immunization of Young Children against Diphtheria Tetanus and Pertussis", *Am. J. Pub. Health*, 40:681.
TENBROECK, C., and BAUER, J. H. (1922-1923), "The Transmission of Tetanus Antitoxin through the Placenta", *Proc. Soc. Exper. Biol. & Med.*, 20:399.
TYSON, R. M., HOUSTON, B. J., and PASCHKIS, M. M. (1950), "Measure of Immunologic Responses to an Improved Preparation of Diphtheria and Tetanus Toxoids (Alum Precipitated) Combined with Pertussis Vaccine", *J. Pediat.*, 37:357.
VAHLQUIST, B. (1949), "Response of Infants to Diphtheria Immunization", *Lancet*, 1:16.
VAHLQUIST, B., and HOGSTEDT, C. (1949), "Studies on Diphtheria. IV. The Skin Factor in the Schick Reaction", *J. Immunol.*, 62:277.
WILSON, R. J. (1951), personal communication.

A METHOD OF TREATMENT OF TRAUMATIC STRICTURE OF THE COMMON BILE DUCT.

By HOWARD BULLOCK,
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TRAUMATIC STRICTURE of the common bile duct, if not very common, is sufficiently prevalent to justify discussing the problem.

The remarks to follow concern patients of mine and of other surgeons who have had the misfortune to develop stricture of the common bile duct after exploration for stones.

"Once a urethral stricture, always a stricture" was the dictum of such surgical giants as the late Patrick Freyer and John Thompson Walker. The same aphorism may be applied to the common bile duct.

The use of the rubber T tube, so widely recommended for drainage of the common bile duct—sometimes for as long as six months—is considered by many surgeons an unwise procedure. Drainage of wounds by rubber tubes invariably leaves an ugly scar, and the same must be expected after prolonged tube drainage of the common bile duct. Scar tissue after any operation is an unpredictable quantity. It may be thick and firm, almost indistinguishable, while in other cases, for some reason unknown, keloid develops.

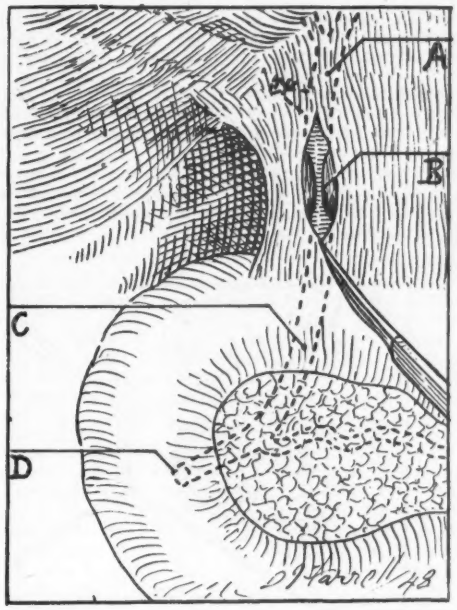

FIGURE I.

Showing the stricture of the common bile duct being exposed by incision of the overlying peritoneum: A, common hepatic duct; B, stricture of common bile duct exposed; C, common bile duct; D, ampulla of Vater.

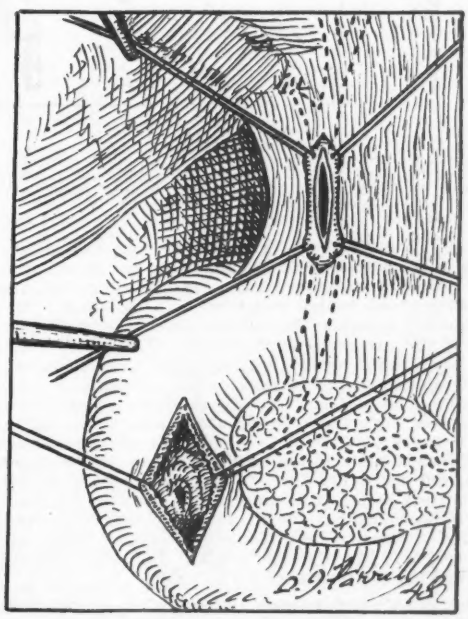

FIGURE II.

The stricture of the common bile duct being held open above and below by four retraction sutures of fine silk, and the stricture being opened.

It seems reasonable to assume, then, that similar phenomena can affect incisions into the common bile duct, however great the care taken and the efficiency of the surgeon. In an address on the repair of injuries to the extrahepatic bile ducts before the Royal Society of Medicine, Howard K. Gray (1951) said that operations on 700 patients suffering from stricture of the extrahepatic bile ducts had been carried out at the Mayo Clinic during the years from 1941 to 1950. Of the patients affected, 70% were under the age of fifty years and 25% were in the fourth decade of life. The condition is a most serious disability for anyone to carry at any age.

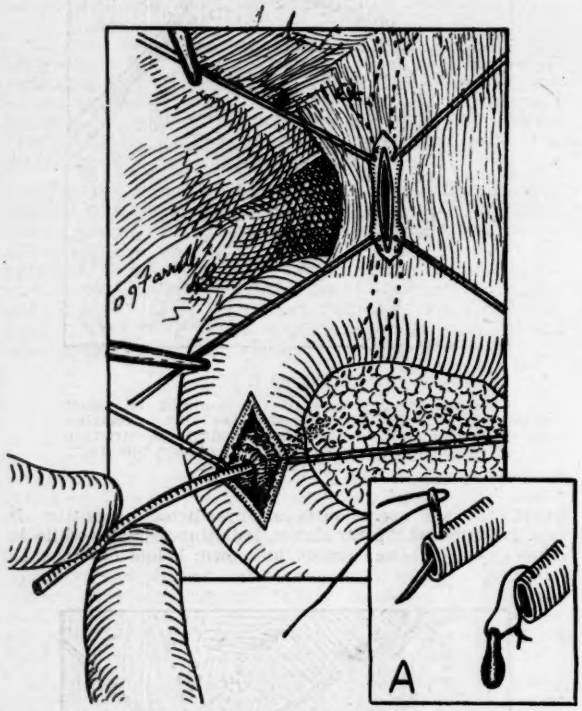

FIGURE III.

Showing the second portion of the duodenum opened and a rubber tube being passed through the papilla of Vater up the common bile duct. Inset, a leaden weight stitched to the duodenal end of the rubber tube.

Gray's investigations revealed the fact that most strictures of the extrahepatic bile ducts are the result of trauma at the time of cholecystectomy. He considers that the vast majority of all benign strictures are man-made. He mentions other possible but infrequent causes of simple stricture of the extrahepatic bile ducts. The strictures that he has been called upon to investigate have occurred after straightforward cholecystectomies performed on thin patients, and not, as one would expect, from operations performed under adverse circumstances, as on fat patients or in acute inflammatory conditions of the gall-bladder. Gray condemns routine exploration of the common bile duct and considers there should be definite criteria for exploration before it is undertaken. He does not enumerate the indications, but he is of the opinion that the added risk of a fatality or prolonged morbidity from exploring the common bile duct is greater than the possibility of overlooking the presence of a calculus.

The experienced surgeon knows when the common bile duct is suspect. It will have lost its healthy, delicate texture; it is no longer soft and easily compressible by the fingers. A stone lying in its lumen will cause dilatation of the duct and thickening of its walls, as a stone in the ureter similarly affects the ureter.

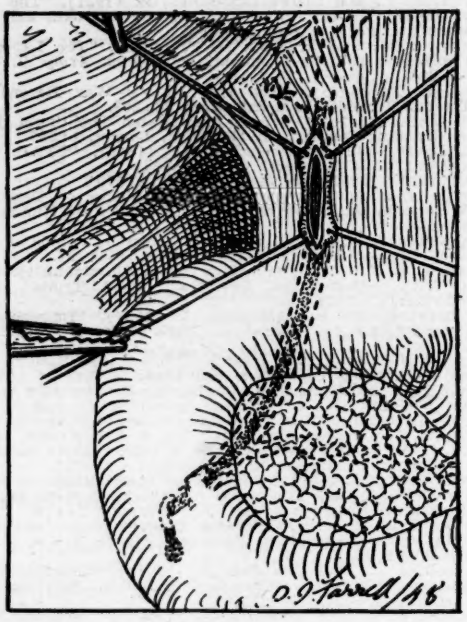

FIGURE IV.

Showing the rubber tube lying in the common duct to a point above the stricture with the weight attached to the duodenal end and the rubber tube stitched to the wall of the duodenum.

The inference to be drawn, then, is that there is always a possibility of a stricture after incision and exploration of the common bile duct, and unless there are paramount reasons for doing so, it should be left untouched.

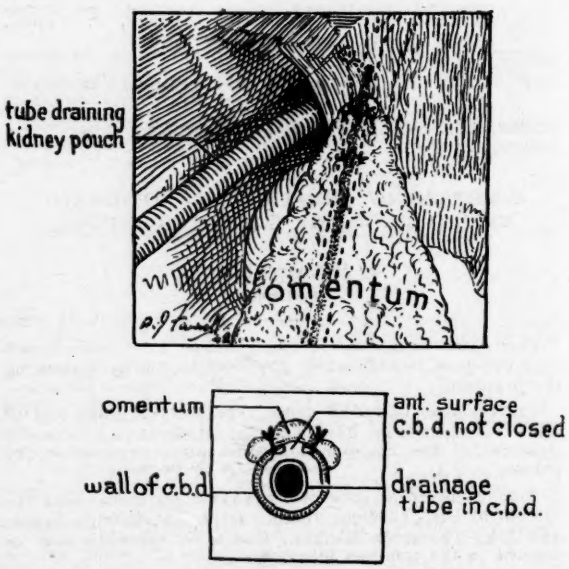

FIGURE V.

Showing the rubber tube lying in the duodenum with omentum stitched over the opening in the common bile duct and a rubber tube draining the right kidney pouch to the outside of the abdomen. Inset, the open anterior surface of the incised common bile duct covered by omentum stitched to its edges. Note: The drainage tube in the common bile duct is of smaller diameter than the common bile duct.

The method described in the diagrams (Figures I to VI) concerns only those cases in which the continuity of the duct exists after exploration has been carried out with the express purpose of detecting the presence or absence of a calculus.

The use of the rubber tube with a weight (approximately three-quarters of an ounce) attached is equally helpful for any repair designed to establish continuity of an injured common hepatic duct or common bile duct, or during trans-

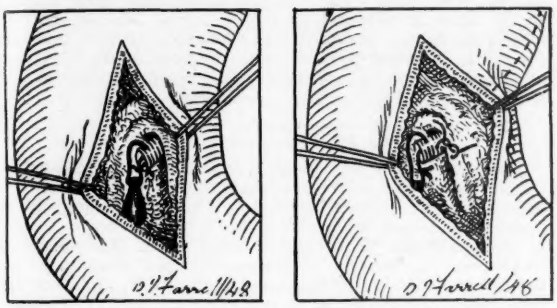

FIGURE VI.

Showing the duodenal end of the rubber tube with the leaden weight attached lying in the second portion of the duodenum and stitched to the duodenum.

plantation of the duct into the gastro-intestinal canal. The tube generally passes *per anum* within a month—its presence has never caused untoward symptoms during the many years of use.

Acknowledgement.

The several diagrams submitted were drawn by the late David Farrell after observing my work in the operating theatre.

Reference.

GRAY, H. K. (1951), "Benign Strictures of the Extrahepatic Bile Ducts", *Proc. Roy. Soc. Med.*, 44: 1005.

CHOLEDOCHODUODENOSTOMY IN DISEASES INVOLVING THE BILIARY AND PANCREATIC DUCTS.

By L. I. BURT,
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CHOLEDOCHODUODENOSTOMY may be of considerable value in certain selected cases of obstruction of the common bile duct, or in the relief of chronic pancreatitis. The operation as described does not enter into the treatment of stricture above the duodenum. Choledochoduodenostomy may be of use in the following conditions: (i) in obstruction due to pancreatitis; (ii) for the relief of recurrent attacks of pancreatitis; (iii) in obstruction due to neoplasm of the head of the pancreas or at the region of the ampulla of Vater, (*a*) operable or (*b*) inoperable; (iv) when a calculus is present in the hepatic or bile ducts.

Recent Articles.

A search of the literature reveals that this subject has been neglected in English and American publications. Pietro Valdoni (1950) reports 200 cases of common duct calculus treated by anastomosis of the common bile duct and duodenum, and extends the indications to some other conditions, including chronic pancreatitis. Mallet-Guy and Jaubert de Beaujeu (1947) discuss external drainage of bile associated with choledochoduodenostomy. Bowers and Greenfield (1951) describe a procedure including choledochojejunostomy for the treatment of pancreatitis which is much more complicated than the technique described here. The title of an article, not yet obtained, by Velasco-Suarez (1951) is included in the references.

Fate of the Fistula.

The anastomosis to be described is performed at the end of the supraduodenal portion and the commencement of the retroduodenal portion of the common bile duct.

It is essential that the future of such an internal biliary fistula should be known. It would be reasonable to suppose that while the bile had access from the common bile duct to the duodenum *per vias naturales*, the fistula would tend to narrow and perhaps finally close. Could it be expected that if the common bile duct was permanently obstructed below the fistula, this opening would remain patent? A fistula persists, as a general rule, when there is an obstruction distal to it. Given a reasonably wide stoma, there is every indication that with an obstruction below it a choledochoduodenostomy will remain open. The final size of the stoma does not need to be very large to effect its purpose. A case of spontaneous cholecyst-duodenostomy has been described (Burt, 1953) in which the internal fistula has been shown to be present after three years. In this article an example is given of a choledochoduodenostomy remaining patent for three years. It will take much more clinical material and many more years than I have had so far available to determine with more certainty the fate of such stomata when created in the presence and in the absence of obstruction.

Choledochoduodenostomy in Obstructive Jaundice due to Pancreatitis.

G.B., a male patient, aged forty-two years, arrived from a country town on August 19, 1949. Six weeks previously he had experienced pain in the right hypochondrium lasting for three or four days, for which he received a hypodermic injection. The pain was not for long of great severity. Jaundice became manifest seven days later. There was no history of pyrexia. Since that time the pain had been very slight, the jaundice was progressive, and over fourteen pounds in weight had been lost.

On examination the patient was a sick man who had obviously lost weight and had gross jaundice. The liver edge was just palpable. A small mass, slightly tender, could be palpated, which was thought and later shown to be the gall-bladder. Muscle guarding was absent in the abdomen. Tests confirmed that the jaundice was post-hepatic. He had previously enjoyed good health and there had been no evidence of any digestive disturbance. The pre-operative diagnosis was (i) obstructive jaundice due to calculus or (ii) carcinoma at the region of the head of the pancreas or the ampulla. At operation the liver was found to be enlarged. The gall-bladder was moderately distended, and when it was opened a very early state of cholesterosis only was revealed. There were two minute cholesterol calculi. The common bile duct was moderately dilated and contained "white bile", which was slightly blood-stained. The head of the pancreas was enlarged and irregularly hard, and in one section there was a very hard nodule. The rest of the pancreas also felt swollen and larger than usual. Fat necrosis was not observed. All tissues were deeply bile-stained. The common bile duct was opened, and also the duodenum at its upper angle. A probe could not be passed into the duodenum from above, and it was felt that the obstruction was due to the pancreas, as the end of the instrument was some distance from the ampulla. Carcinoma of the head of the pancreas could not be excluded. Choledochoduodenostomy was performed in the manner to be described and the gall-bladder was drained.

Liver function returned rapidly, two ounces of bile being drained from the gall-bladder in twenty-four hours. From then on, bile drainage was copious. In a few days the appearance of bile in the intestines and of urobilinogen in the urine determined the removal of the cholecystostomy tube, and bile drainage to the exterior ceased rapidly. The stoma had been protected in some measure by continuous suction from a duodenal tube for three days.

This patient was operated upon again in October, 1949, to determine the state of the pancreas, and with a view to possible pancreatectomy. It was obvious at this operation that the diseased condition had been due to pancreatitis,

The pancreas had not returned entirely to normal, but was much smaller and softer, and the hard nodule no longer under suspicion. The abdomen was closed. Since this time the patient has regained his full weight and has been entirely free from symptoms.

X-ray examination with a barium meal performed in July, 1952 (three years later) showed the common bile duct to be filling from the still patent fistula.

The procedure chosen might be criticized on the grounds that the patient was very ill and was subjected to a longer operation than that involved in drainage of the gall-bladder alone or of the common bile duct alone. Reference to the description of technique will show that this risk is not so great as might at first appear. The advantages outweighed any additional risk. The liver also had ceased secreting, which minimized the risk of leakage at the anastomosis. The patient, deprived of the functions of bile for so long, regained them immediately the liver recovered. There was every possibility that the obstruction was permanent. The closing of an external fistula would have had to wait on the sufficient recovery from the pancreatic disease or on future surgical treatment.

Relief of Recurrent Attacks of Pancreatitis.

It is suggested that when pancreatitis is the result of biliary disease, choledochoduodenostomy may yet prove a potent weapon in preventing recurrent attacks. (This disease can occur in the absence of biliary disease and is then similar to calculus formation and inflammation that occurs in the salivary glands.)

The operation is not suggested for the treatment of the acute attack. The technical difficulties also are greater with an undilated bile duct.

Obstruction due to Neoplasm of the Head of the Pancreas or at the Region of the Ampulla of Vater.

Operable Neoplasms.

In jaundice due to neoplasm the patient is not in a fit state to withstand the heroic procedure involved in duodenectomy or pancreatectomy. Choledochoduodenostomy as a first stage offers a quick return to as normal a physiological state as possible. The second procedure then does not have to be performed in the presence of an external biliary fistula. The anastomosis is so placed that it can be mobilized and turned up with the duodenum and without appreciable loss of length of the supraduodenal portion of the common bile duct.

Inoperable Neoplasm.

When the neoplasm is inoperable the patient will at least be free of obstructive jaundice for a time, and more able to enjoy the short span of life remaining.

Calculus in the Bile Ducts.

Occasionally numerous calculi in the bile ducts are encountered. For example, in one such case dozens of small calculi were washed out of the bile ducts, which were crowded with stones. When the irrigating fluid appeared clear, a final irrigation would continually produce just one or two more small calculi. One could never be sure that all had been removed. Even though in such a case the ampulla is widely dilated, it is possible that a remaining calculus may cause obstruction. A persistent fistula may then result. Choledochoduodenostomy provides an easy passage for any calculus remaining.

One of the failures which occur in attempting to remove a calculus from the common bile duct provides a further indication. A calculus slips from the surgeon's palpating fingers and cannot be recovered. Occasionally, too, a second calculus is overlooked. Operative cholangiography is not yet a common procedure, and still does not mean a recovered calculus. Closure of the abdomen without the recovery of the stone means a second procedure. Future exploration which may be required without the gall-bladder as a guide can be a nightmare. (Cholecystectomy should not be performed until after the completion of duct surgery.) Choledochoduodenostomy may well be considered when stones are found in the common bile duct.

Comment.

The danger lies in the chance that the calculus may come to rest in the retroduodenal cul-de-sac below the created stoma of the choledochoduodenostomy. From what I have observed of the ball-value habits of common duct stone, it is more likely to pass through the large internal fistula eventually. The amount of trouble such a stone would cause if it remained in the lowest part of the duct is not certain. It must also be remembered that the procedure does not prevent further operation on the supraduodenal portion of the duct. The work of Valdoni supports the usefulness of this operation.

The Possibility of Stricture.

Whatever procedure is used in closing an incision in the common bile duct after exploration, some degree of narrowing is inevitable, even when the longitudinal incision is closed transversely, as some advocate. There is no immediate narrowing of diameter in this operation. Subsequent narrowing is dependent upon closure of the fistula, a result of inflammation and repair, and this process has its contribution from the duodenum. The risk of stricture can only be assessed by a longer follow-up of a large number of cases, and choledochoduodenostomy is, of course, a relatively rare operation.

Technique.

The end of the supraduodenal portion and the commencement of the retroduodenal portion of the common bile duct is selected for the opening. The incision is not quite longitudinal. The openings in the duct and in the commencement of the under part of the upper angle of the duodenum are made parallel and in accordance with the lie of the structures. Opportunity is afforded for more accurate exploration of the region and for guidance of the passage of a probe.

The retroduodenal parts of the two structures are already in contact and act as the second layer of the anastomosis. The edges are united with a continuous suture of finest catgut, full thickness of bile duct and all duodenal thickness except serosa being taken in. The second layer is now completed, peritoneum only being used. This second layer uses only the available superior edges. The size of the stoma is a matter for judgement. The performance of the anastomosis, while delicate and requiring gentleness, is not time-consuming compared with the exploration, especially with a dilated common bile duct.

Comment.

The danger of leakage is always present in this procedure. Much of the fear of external fistula formation from opening of the duodenum has been reduced by more accurate intubation and continuous suction and by prevention of deranged fluid and electrolyte balance. Also, it can be reduced by additional supraduodenal drainage by gall-bladder or common bile duct. A very small incision and tube will be required in either case. This external drainage associated with the internal fistula is again a matter for judgement based on the disease process.

Summary.

1. Indications for common bile duct duodenal anastomosis are listed.

2. Reference is made to some recent articles of interest.

3. The fate of the fistula is discussed.

4. The procedure is discussed in relation to (i) pancreatitis causing obstructive jaundice, (ii) recurrent attacks of pancreatitis, (iii) neoplasm, (iv) calculus of the bile ducts.

5. The possibility of stricture formation is considered.

6. A description is given of a technique adopted.

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References.

BOWERS, R., and GREENFIELD, J. (1951), "Choledochojejunostomy: Its Role in the Treatment of Chronic Pancreatitis", *Ann. Surg.*, 134: 99.

BURT, L. I. (1953), "Observations on Biliary Calculus Ulcerating into the Small Intestine", M. J. AUSTRALIA, 1: 444.

MALLET-GUY, P., and DE BEAUJEU, J. (1947), "*Sur l'association d'un drainage biliaire externe à la cholédoco-duodénostomie d'indication relative*", *Lyon chir.*, 42: 237.

VALDONI, P. (1950), "Anastomosis of Common (Bile) Duct and Duodenum as Treatment for Stones in Common Duct", *Sc. med. ital.*, 1: 76.

VELASCO-SUAREZ (1951), "Biliary Digestive Anastomosis and Angio-cholitis", *Bol. y trab., Acad. argent. de cir.*, 19: 35.

MULTIPLE INTESTINAL INFECTION.

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IN May, 1951, an outbreak of gastro-enteritis occurred in a hospital ward containing 22 premature babies. The sick infants were passing an increased number of stools, which contained blood and mucus. Rectal swabs were obtained from the patients. Thirteen babies were found to harbour *Salmonella newport* and the pathogen appeared four times in association with *Bacterium coli* D 433. Also, in the initial stage of the outbreak the rectal swabs from two babies yielded *Pseudomonas pyocyanea* in association with Salmonella. In two other cases biochemically different paracolon bacilli were isolated, once in association with Salmonella.

In the second week of the outbreak the pattern changed. Salmonella and *Bact. coli* D 433 were still present, but a new identical strain of paracolon bacillus was recovered from the rectal swabs of nine babies, three times in association with Salmonella.

The outbreak was explosive in character and confined to a premature babies' ward. Four babies died; specimens from two of them contained Salmonella, a specimen from one had Salmonella and the paracolon bacillus, while the death of the fourth one was possibly due to the combined infection of pneumonia and Salmonella with *Bact. coli* D 433 gastro-enteritis.

At the time of the outbreak several cases of diarrhœa were reported amongst adults in the hospital, the patients including a "contact" nurse and patients from an ante-natal and after-care ward. However, on bacteriological examination of these persons no pathogenic bacteria were detected.

"Chloromycetin" was administered to all sick babies. During and after treatment, *S. newport*, *Bact. coli* D 433 and the homogeneous type of paracolon strain were still recovered from the rectal swabs of some babies, but there were no secondary cases.

Bacteriological Features.

Methods.

Rectal swabs were plated out on blood agar, MacConkey or plain desoxycholate agar, or SS agar, and cultivated for twenty-four hours in enrichment tetrathionate broth from which subcultures were made to SS agar.

The bile salt media were used for the isolation of Gram-negative non-lactose-fermenting bacilli, which were subjected to further biochemical tests. The Salmonella strains were typed serologically according to the procedure of Edwards and Bruner (1942). A representative strain of the biochemically homogeneous group of paracolon bacilli was used for the preparation of H and O antisera. For the isolation of *Bact. coli* D 433, blood agar and the less selective bile salt media—namely, MacConkey or plain desoxycholate agar—were used. As a preliminary procedure for the identification of *Bact. coli* D 433, four colonies on each plate and also composite growth obtained by needle strokes across the plates were tested by slide agglutination with *Bact. coli* D 433 OB antiserum. Colonies which gave positive slide agglutination reactions were tested at a later date by tube agglutination with *Bact. coli* D 433 OB and O antisera received from England by courtesy of Colonel Bensted. One of these strains, which agglutinated to full titre with the above antisera, and also a strain of *Bact. coli* D 433 ($O111:B_4:H_2$), kindly sent from England by Dr. Joan Taylor, were used for the preparation of OB (living), H (formalinized) and O (boiled) suspensions and the corresponding antisera in rabbits according to Kauffmann's (1947) directions. The six suspensions and the six antisera were employed for agglutination and agglutinin-absorption tests.

Results.

The organisms of interest belonged to four different genera.

Salmonella.—The best results in recovery of Salmonella were obtained with the use of tetrathionate broth followed by SS agar. The organism was typed as *S. newport* VI, VIII . . . e,h ⟷ 1, 2, 3 . . . and this identification was confirmed by Dr. Taylor.

Bact. coli D 433.—The colonies were detected on blood agar and the less selective bile salt media and usually grew in large numbers. In each case of *Bact. coli* D 433 infection *S. newport* was also recovered. *Bact. coli* D 433 isolated in this outbreak was non-motile on first isolation when incubated in broth at 37°C., but the strain became motile when repeated passages were made in semi-solid agar at 22°C. Agar cultures had a characteristic spermatic odour. The biochemical reactions were as follows: acid and gas appeared after twenty-four hours' incubation at 37°C. in lactose, glucose, mannitol, maltose, dulcitol, galactose, sorbitol, xylose, rhamnose, arabinose; sucrose was fermented in two days and salicin in five days; adenitol, inulin, inositol were not fermented; the test for mucate gave a positive result and those for sodium citrate and *d*-tartrate negative results; acid and clot were formed in litmus milk, gelatin was not liquefied, sulphuretted hydrogen was not produced in Kligler's medium, urea was not hydrolysed, sheep and horse blood was not hæmolysed. IMVEC reactions were "+ + − + −". Thus, this organism proved to be *Bacterium* (*Escherichia*) *coli* type I.

Biochemically, the strain corresponded to the fermentative type I described by Kauffmann and Dupont (1950) and Kauffmann (1951).

The OB, H and O suspensions, prepared with *Bact. coli* D433 strain received from Dr. Taylor and with the one isolated locally, were agglutinated with the OB, H and O antisera to diagnostic titre. In the mirror agglutinin-absorption tests both strains exhausted the appropriate antisera. This indicated the identical antigenic pattern of both strains; thus the Melbourne culture proved to have the formula O111 : B_4 : H_2 (Kauffmann and Dupont, 1950).

Paracolon Bacillus.—The paracolon bacillus was recovered from all the types of bile salt media and also from the tetrathionate and SS agar combination. The strains which were found to be biochemically homogeneous were designated paracolon 2077. They were isolated three times in association with Salmonella, and six times they were the sole representatives of the Gram-negative non-lactose-fermenting flora in the stools. The following were the characteristic features of paracolon 2077: it was motile on the first isolation; in 1% lactose acid appeared after three days' incubation and gas after five days, while 5% lactose was slightly acidified after twenty-four hours at 37°C. The IMVEC reactions were "− − + − +", which, according to Bergey's "Manual of Determinative Bacteriology" (1948), places the organism in *Paracolobactrum aerogenoides* type I group. Acid and gas were produced after twenty-four hours' incubation at 37°C. in mannitol, glucose, sucrose, maltose, galactose, sorbitol, xylose, rhamnose, arabinose; insalicin acid and gas appeared in three days; dulcitol, adonitol, inulin and inositol were not fermented; a positive result was obtained for mucic acid and sodium citrate and a negative result for *d*-tartrate; litmus milk showed acid and clot, gelatin was liquefied after twenty-eight days of

incubation, urea was hydrolysed slowly, sulphuretted hydrogen was absent in Kligler's medium, horse and sheep blood was not hæmolysed. All the biochemically homogeneous strains gave full titre agglutination reactions with the H and O antisera produced with suspensions of strain 2077 and proved to be antigenically identical in agglutinin-absorption tests.

Pseudomonas Pyocyanea.—Ps. pyocyanea appeared in two instances on SS agar in association with *S. newport* and in great profusion on plain desoxycholate agar as the only non-lactose-fermenting type of colony.

Discussion.

From the epidemiological and clinical aspects the incidence of four different bacterial genera associated in an outbreak of gastro-enteritis is of interest and warrants a survey of the literature on the frequency of occurrence and evidence of pathogenicity of the encountered strains.

S. newport has an established claim to pathogenicity. The organism is of high incidence in gastro-enteritis in various parts of America and is one of the commonest strains isolated from outbreaks of food poisoning in Great Britain (Wilson and Miles, 1946). In Australia only a few sporadic casese were reported from South Australia, Queensland and New South Wales (Atkinson, Woodroofe and Macbeth, 1944; Mackerras and Mackerras, 1949; Atkinson, Woodroofe and Culver, 1952). In Victoria, *S. newport* was hitherto not considered a common species (Mushin, 1950; Report of the Public Health Laboratory, 1951). In general, the survey of salmonellosis in Australia shows that the organism was encountered in sporadic cases only, the outbreak described in this paper being the first one on record.

Bact. coli D 433 was first isolated in England from cases of summer diarrhœa and named *Bact. coli* var. *neapolitanum* (Bray, 1945). Since then, various reports from England (Bray and Beaven, 1948; Giles and Sangster, 1948; Taylor, Powell and Wright, 1949; Giles, Sangster and Smith, 1949; Kirby, Hall and Coackley, 1951) have indicated a close association of this organism with outbreaks of infantile gastro-enteritis occurring during different seasons of the year. A similar serological type was recovered in various parts of the world—for example, United States of America, Sweden, Denmark, Holland, Finland, Germany, Austria, Italy (Kauffmann, 1951), France (Buttiaux, Christiaens, Breton and Lefebvre, 1951) from cases of gastro-enteritis in babies. In Australia prior to this outbreak, *Bact. coli* D 433 was listed in sporadic cases by Perry (personal communication) in Melbourne and by Williams (1951) in Sydney. Recently a report came from the Queensland Institute of Medical Research (1951), in which the isolation of this organism was mentioned. According to data kindly supplied by Ludford (personal communication), this serotype was first encountered in Brisbane in normal children and later in two outbreaks of gastro-enteritis.

The views held by various workers with regard to the pathogenicity of *Bact. coli* D 433 are conflicting, as some writers presented proof in support of the ætiological significance of this organism in gastro-enteritis, while others questioned its causative role. Because of the absence of a definite pathological picture (Giles *et alii*, 1949; Kirby *et alii*, 1950), the main arguments for establishing the pathogenic character of this bacterium are based on the following data: (i) the incidence in abnormal stools as compared with normal stools; (ii) the failure of isolation of other intestinal pathogens; (iii) the results of feeding experiments on human volunteers; (iv) the serological response.

1. The significantly higher incidence of this bacterium in abnormal stools may be considered as circumstantial evidence for its pathogenicity. Most of the data found in literature indicated that specimens from babies suffering with this specific type of infectious gastro-enteritis yielded a profuse growth of *Bact. coli* D 433 on the appropriate media, while only a small percentage of healthy infants were carriers of this organism (Taylor *et alii*, 1949; Kirby *et alii*, 1950). On the other hand, some studies indicated a comparatively high frequency of this serological type in stools of control series of infants (Cathie and MacFarlane, 1951), and of symptomless contacts (Payne and Cooke, 1950). A view was expressed recently (Shanks and Studzinski, 1952) that the presence of this organism in clinical cases was not frequent enough to establish a causal relationship. The overwhelming evidence is not for the commensal role of *Bact. coli* D 433, but for its close association with gastro-enteritis.

2. In large outbreaks of gastro-enteritis attributed to *Bact. coli* D 433 no other intestinal pathogens were usually isolated. However, in a few instances the organism was encountered together with a pathogen or a potential pathogen. Williams (1951) listed *Bact. coli* D 433 in three out of 13 cases of salmonellosis, two of them due to *S. typhi-murium* and one to *S. adelaide*. Bray (1945) and Smith (1949) found on several occasions this coliform serotype together with *Shigella sonnei*. Smith, Galloway and Speirs (1950) reported four cases of *Bact. coli* D 433 (O111 : B_4) with *Bact. coli* type β (O_{55} : B_5). The possibility of an intimate association of *Bact. coli* D 433 with another agent—for example, a virus—was considered (Taylor *et alii*, 1949; Kirby *et alii*, 1950). In our investigations the fæcal specimens from four babies yielded *S. newport* and *Bact. coli* D 433. In view of the recognized pathogenicity of *S. newport* one may postulate the presence of two causative agents of gastro-enteritis or the concomitant role of *Bact. coli* D 433.

3. Feeding tests were performed by various workers on adult volunteers (Kirby *et alii*, 1950; Ferguson and June, 1952), and also on a baby with multiple congenital defects (Neter and Shumway, 1950). The baby developed diarrhœa and the organism was isolated from fæces, throat and nasopharynx. In the series of tests performed on adults (Kirby *et alii*, 1950), an illness comparable with infantile gastro-enteritis was recorded, but symptoms differed with strains cultivated under varied conditions. The data published by Ferguson and June (1952), who employed an impressive total of 114 volunteers, indicated that ingestion of very large doses produced acute symptoms while smaller doses had little or no effect. Thus the feeding tests on human subjects furnished additional data on the pathogenicity of this bacterium.

4. A definite antibody response in the serum of patients may indicate a relationship between an invading bacterium and symptoms in the host; but in babies the antibody production may not be well established. In our study of the outbreak the premature babies could not be test-bled. Data on the antibody response in serum of infants during outbreaks associated with *Bact. coli* D 433 are scanty. Bray (1945) did not consider significant the titre of agglutinins in the blood of infants harbouring this organism, as in only one case out of ten was a high titre (1 : 320) obtained with the autogenous strain. Giles *et alii* (1949) examined a larger series of patients, and found in 21 out of 41 cases agglutinins ranging from 1 : 40 to 1 : 640 in titre, the antibody level being higher against somatic bacterial suspensions than against living ones, while no significant agglutinations were recorded by these workers in the sera of 53 normal infants. In a small series of blood specimens from babies suffering from *Bact. coli* D 433 infection (Neter and Shumway, 1950; Modica, Ferguson and Ducey, 1952), only one of them gave a significant O titre (1 : 256). Experiments on the feeding of adult volunteers with this bacterium (Ferguson and June, 1952) indicated the development of high-titre serum agglutinins for the organism especially for O suspensions. Apparently more serological data are wanted on the antibody response in babies harbouring this coliform serotype.

Thus, with regard to the problem of the ætiological role of *Bact. coli* D 433, the general impression remains that additional data on infectious gastro-enteritis in babies harbouring this organism are necessary to complete the picture. Our investigation mainly stresses the possibility of a predisposing factor, in this case the presence of *S. newport*, contributing to the colonization of the intestinal tract by *Bact. coli* D 433.

Paracolon bacilli form a biochemically and serologically heterogeneous group. Some types have a claim to patho-

genicity—for example, Arizona, Ballerup, Bethesda groups (Kauffmann, 1951). The presence of small numbers of paracolon bacilli in normal stools may be of no significance, while the appearance of large numbers is usually secondary to metabolic disorders. They appear in cases of gastro-enteritis together with pathogens—for example, Salmonella or Shigella—or they may be found during sickness or convalescence as the sole representatives of the non-lactose-fermenting Gram-negative bacteria in the intestinal tract (Mushin, 1949).

In the outbreak described in this paper an identical paracolon strain appeared in nine cases towards the end of the outbreak. One may postulate two theories—the enhanced virulence of paracolon strains under abnormal conditions in the alimentary tract, and the possibility of a secondary invader establishing itself after the pathogen has caused tissue damage.

The temporary colonization of the intestine in two cases by *Ps. pyocyanea*, which is not a normal inhabitant of the alimentary canal of babies (Mushin, 1950), was probably due to the pathological conditions.

The multiple intestinal infection described in this paper indicates that cross-infection in hospital may not supply sufficient evidence for the incrimination of an organism as the primary causative agent of disease. Contributing factors may make possible the establishment of secondary invaders. *Bact. coli* D 443, regarded by many investigators as an intestinal pathogen, may have assumed here the role of a secondary agent. The combined action of *S. newport* and *Bact. coli* D 433 produced a general impression of less severe illness than has been described in other outbreaks of gastro-enteritis attributed solely to the coliform organism. However, administration of "Chloromycetin" at an early stage probably controlled the spread of infection, and also the incriminated bacterial strains could have been of a comparatively low virulence.

Paracolon bacilli and *Ps. pyocyanea* were able to establish themselves in the alimentary tract when the defences of the host were impaired. The additional invasion of apparently non-pathogenic bacilli following the initial outbreak of gastro-enteritis may lead to errors in interpretation, especially when the causal organisms are not recovered from the stools—for example, owing to delayed bacteriological examination. It is suggested that after a pathogen responsible for an intestinal disorder has been detected, it may be of interest to continue the bacteriological examination in search of other concomitant organisms. This may allow for the closer understanding of the pattern of association of various intestinal bacteria.

Summary.

1. An account is given of an outbreak of gastro-enteritis amongst premature babies in a hospital ward. Four different bacterial genera were associated with the infection—namely, *S. newport*, *Bact. coli* D 433, paracolon bacillus and *Ps. pyocyanea*.

2. Bacteriological data are recorded on the isolation and characteristics of the organisms.

3. A survey of literature is made on the incidence of the encountered strains in gastro-enteritis, and the evidence of their pathogenicity is assessed. The possibility of erroneous interpretation of an additional bacterial invasion following an initial attack of gastro-enteritis is stressed.

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References.

ATKINSON, N., WOODROOFE, G. M., and MACBETH, A. M. (1944), "The Occurrence of Salmonella Types in Australia. 2", *Aust. J. Exper. Biol. & M. Sc.*, 22 : 201.

ATKINSON, N., WOODROOFE, G. M., MACBETH, A. M., and CULVER, D. E. (1952), "The Occurrence of Salmonella Types in Australia. 8", *Aust. J. Exper. Biol. & M. Sc.*, 30 : 73.

BRAY, J. (1945), "Isolation of Antigenically Homogeneous Strains of Bact. Coli Neapolitaneum from Summer Diarrhœa of Infants", *J. Path. & Bact.*, 57 : 239.

BRAY, J., and BEAVAN, T. E. D. (1948), "Slide Agglutination of Bact. Coli var. Neapolitanum in Summer Diarrhœa", *J. Path & Bact.*, 60 : 395.

BREED, R. S., MURRAY, E. G. D., and PARKER HITCHENS, A. (1948), "Bergey's Manual of Determinative Bacteriology", Sixth Edition, Baltimore, The Williams and Wilkins Company.

BUTTIAUX, R., CHRISTIAENS, L., BRETON, A., and LEFEBVRE, G. (1951), "*Gastro-entérites infantiles à Escherichia coli*", *Presse méd.*, 59 : 1000.

CATHIE, I. A. B., and MACFARLANE, J. C. W. (1951), "Incidence of Bact. Coli O group 111 in Sporadic Infantile Gastro-Enteritis", *Brit. M. J.*, 2 : 1002.

EDWARDS, P. R., and BRUNER, D. W. (1942), "Serological Identification of Salmonella Cultures", (Station) Circular 54, University of Kentucky, Agricultural Experimental Station.

FERGUSON, W. W., and JUNE, R. C. (1952), "Experiments on Feeding Adult Volunteers with Escherichia Coli O 111, B4, a Coliform Organism Associated with Infantile Diarrhea", *Am. J. Hyg.*, 55 : 155.

GILES, C., and SANGSTER, G. (1948), "An Outbreak of Infantile Gastro-Enteritis in Aberdeen", *Am. J. Hyg.*, 46 : 1.

GILES, C., SANGSTER, G., and SMITH, J. (1949), "Epidemic Gastro-Enteritis of Infants in Aberdeen During 1947", *Arch. Dis. Childhood*, 24 : 45.

KAUFFMANN, F. (1947), "The Serology of the Coli Group", *J. Immunol.*, 57 : 71.

KAUFFMANN, F. (1951), "Enterobacteriaceæ", Copenhagen, Ejnar Munksgaard.

KAUFFMANN, F., and DUPONT, A. (1950), "Escherichia Strains from Infantile Epidemic Gastro-Enteritis", *Acta path. et microbiol. scandinav.*, 27 : 552.

KIRBY, A. C., HALL, E. G., and COACKLEY, W. (1950), "Neonatal Diarrhœa and Vomiting", *Lancet*, 2 : 201.

MACKERRAS, M. J., and MACKERRAS, I. M. (1949), "Salmonella Infections in Queensland", *Aust. J. Exper. Biol. & M. Sc.*, 27 : 163.

MODICA, R. I., FERGUSON, W. W., and DUCEY, E. F. (1952), "Epidemic Infantile Diarrhea Associated with Escherichia Coli 111, B4", *J. Lab. & Clin. Med.*, 39 : 122.

MUSHIN, R. (1949), "Studies on Paracolon Bacilli", *Aust. J. Exper. Biol. & M. Sc.*, 27 : 543.

MUSHIN, R. (1950), "Bacteriological Aspects of Gastro-Enteritis in Infants", *Aust. J. Exper. Biol. & M. Sc.*, 28 : 493.

NETER, E., and SHUMWAY, C. N. (1950), "E. Coli Serotype D 433: Occurrence in Intestinal and Respiratory Tracts, Cultural Characteristics, Pathogenicity, Sensitivity to Antibiotics", *Proc. Soc. Exper. Biol. & Med.*, 75 : 504.

PAYNE, A. M. M., and COOK, G. T. (1950), "A Specific Serological Type of Bact. Coli Found in Infants' Home in Absence of Epidemic Diarrhœa", *Brit. M. J.*, 2 : 192.

"REPORT OF THE PUBLIC HEALTH BACTERIOLOGICAL LABORATORY" (1951), Department of Health, Victoria.

REPORT, THE QUEENSLAND INSTITUTE OF MEDICAL RESEARCH (1951).

SHANKS, R. A., and STUDZINSKI, L. P. (1952), "Bact. Coli in Infantile Diarrhœa", *Brit. M. J.*, 2 : 119.

SMITH, J. (1949), "The Association of Certain Types (α and β) of Bact. Coli with Infantile Gastro-Enteritis", *J. Hyg.*, 47 : 221.

SMITH, J., GALLOWAY, W. H., and SPEIRS, A. L. (1950), "Infantile Gastro-Enteritis with Special Reference to the Specific Serological Type O55B5H6 (Beta Type) of Bacterium Coli", *J. Hyg.*, 48 : 472.

TAYLOR, J., POWELL, B. W., and WRIGHT, J. (1949), "Infantile Diarrhœa and Vomiting", *Brit. M. J.*, 2 : 117.

WILLIAMS, S. (1951), "The Bacteriological Considerations of Infantile Enteritis in Sydney", M. J. AUSTRALIA., 2 : 137.

WILSON, G. S., and MILES, A. A. (1946), "Topley and Wilson's Principles of Bacteriology and Immunity"; Third Edition; London, Edward Arnold and Company.

RUPTURED ECTOPIC PREGNANCY: A REVIEW OF FORTY-EIGHT CASES.

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THE series of cases to be described consists of forty-eight cases of ruptured tubal pregnancy treated at Sydney Hospital over the past ten years. The condition has not been common in our hospital practice, but has entered into the differential diagnosis of acute abdominal conditions in many female patients. The review of these cases is approached from the point of view of the senior resident medical officer of a large metropolitan hospital, and is chiefly concerned with certain aspects of symptomatology, findings on physical examination, diagnosis, surgical treatment and immediate results of treatment.

It would seem reasonable to begin with the patients as they enter hospital. Thirty-two came via the casualty department, nine from honorary gynæcologists or from the gynæcological out-patient department, and five from outside practitioners, and there is no record of the origin of two

cases. Of the patients admitted through the casualty department, nineteen arrived by ambulance and the rest walked in. This affords a small indication of the varying degrees of severity of symptoms and signs experienced by these patients.

The age distribution of patients was from twenty to forty years, the majority being in the second of these decades. Twenty of the 48 cases occurred in patients aged between twenty-six and thirty-one years, but it would seem wise to regard any age in the reproductive years of woman as capable of being associated with an ectopic pregnancy.

Another feature of interest is the stated marital status of the patients; 37 were stated to be married, eight were single, two were divorced and one was a widow.

In all cases of abdominal pain in women the determination of the exact date of the last menstrual period is important. The only cases in this series in which this date is not recorded are four in which the patients were admitted to general surgical wards as suffering from some other acute abdominal emergency. Classically, in a ruptured ectopic pregnancy there is a history of a menstrual period being at least a little overdue. The present series of cases shows a wide variation in the date of the last menstrual period, ranging from six to ninety days. Of the 48 patients, 34 developed symptoms after the normal twenty-eight day cycle had elapsed. It would seem wise not to place too much reliance on the presence or absence of a missed menstrual period in the diagnosis of these cases.

All patients complained of abdominal pain. In 22 cases the onset was sudden, the pain occurring in 16 on the right side of the lower part of the abdomen, in eight on both sides of the lower part of the abdomen. The pain was in the suprapubic area in four patients, in the left iliac fossa in four patients, in the epigastrium in six, and in the umbilical region in three. Characteristic pain in the back or shoulders was seen in 19 of our series. Four patients had pain referred to the perineum or rectum, and in two others the pain radiated down the back of the leg. In 29 of the recorded cases the pain was of a colicky nature and in the remainder it was of a constant type. The duration of the pain varied greatly, but it is important to note that many patients had recurrent bouts of pain, of less severity, spaced over periods of up to three weeks before they presented with the dramatic symptoms and signs of rupture. In others again rupture occurred without preliminary warning.

Other symptoms included sweating, palpitations and thirst—indications of excessive blood loss and shock. Diarrhœa and constipation were observed in several patients, and no doubt were due to accumulating hæmatocele in the pouch of Douglas.

Vaginal bleeding occurred in over half the cases, the bleeding being excessive in only one instance. Usually the bleeding consisted of a mere spotting of dark blood repeated over several days, or even at intervals over several weeks, prior to the patient's presenting at hospital. There was no recorded instance of the passage of a uterine cast in this series.

In these cases the pulse rates on the patient's admission to hospital ranged from 45 per minute, in a patient with associated heart disease, to 145 per minute. About half the patients had no elevation of pulse rate above a normal figure of 80 per minute. The temperatures varied from 96·0° to 99·6° F., and 29 of the patients showed a depression of the reading below the normal figure of 98·4° F. The blood pressure was, in many instances, maintained at normal levels, but readings such as 80 millimetres of mercury, systolic, and 50 millimetres of mercury, diastolic, were by no means uncommon.

On examination of the patient, abdominal tenderness, mostly without obvious guarding or rigidity, was present in 41 cases. The distribution of the tenderness was as follows: eight patients had generalized abdominal tenderness, 12 patients had lower abdominal tenderness, 10 patients had tenderness in the right iliac fossa, six patients had tenderness in the left iliac fossa, and five had epigastric tenderness.

Signs of breast activity were recorded in only four patients.

Little else was noted on general examination save pallor, sweating and distress, which in one patient amounted to definite air hunger and in another to inability to lie down.

Vaginal examination revealed some tenderness in 29 patients. In a few this was of such intensity that bimanual examination was precluded. In 25 the cervix was softer than usual, and in 17 the uterus was considered to be somewhat enlarged. A palpable mass was detected in one or other of the fornices in 17 cases.

The past obstetrical history of these patients may be summarized as follows: 19 had had no pregnancy, 13 had had one pregnancy, six had had two pregnancies, three had had three pregnancies, three had had four pregnancies, and one had had seven pregnancies. Included in the foregoing were eight patients who had had one miscarriage and three patients who had had two miscarriages.

Two of the 48 patients had previously had an ectopic pregnancy in the other Fallopian tube, and one patient had been undergoing treatment at a sterility clinic.

The time which had elapsed since the last pregnancy ranged from three months to sixteen years. In 24 cases over three years had elapsed since the last pregnancy.

Two-thirds of the patients were correctly diagnosed as suffering from ruptured ectopic pregnancy. Pitfalls of diagnosis included nine other conditions; the most common errors were ovarian cyst, acute appendicitis and intestinal obstruction. An erroneous diagnosis was made on one occasion of each of the following conditions: threatened abortion, cystitis, pyelitis, cholecystitis and salpingitis.

On the patients' admission to hospital routine hæmoglobin estimations were performed. Forty-three of the patients had a hæmoglobin value of less than 12 grammes *per centum*, and two-thirds of the patients had one below 10 grammes *per centum*. The lowest figure was 4·6 grammes *per centum* and the highest was 13·3 grammes *per centum*. The correlation between low hæmoglobin figures and shock symptoms in the patients reviewed was high.

The time lag between admission to hospital and operation is of particular interest in any surgical emergency. The time elapsing between admission to hospital and examination by the honorary medical officer, when this information was recorded, was in most instances under two hours, and in all cases under seven hours. More than 24 of the patients were submitted to operation within three hours of their admission to hospital, and about 39 inside eight hours. The remaining patients, for whom the diagnosis was in doubt, were treated conservatively for periods of from one to thirteen days before operation. In one case—the only fatal case in the series—in which the condition was unsuspected, no operation was performed, although the patient was in hospital for ten days.

The operation performed in 41 of the 48 cases was unilateral salpingectomy and removal of blood clot from the peritoneal cavity. In another three cases bilateral salpingectomy was performed. The ovary was removed in one case because of associated endometriosis, and an ovarian cyst was resected in one other case. In two instances coincident appendicectomy was also performed.

In this series of patients, most of whom were suffering more or less from shock, safe simple anæsthetics were those of choice. Many of these operations were performed during the night as emergencies, and the administration of the anæsthetic fell to the lot of the resident medical officer. This is borne out by the fact that, of the recorded anæsthetics, 26 were either ethyl chloride and ether or "Pentothal", ethyl chloride and ether, and another 14 were "Pentothal", nitrous oxide and ether. Relaxants were used in only two cases and spinal anæsthesia was used in one.

At operation the rupture was found on the right side in 32 cases and on the left side in 16 cases. These figures show a significant difference. In a search for the reason for the predominance of the right side, various factors were considered. Firstly, only four patients had a history of past salpingitis or pelvic inflammation, and in these there

was no localization of the process to either side. An investigation of the abdominal operations which these patients had undergone revealed that 12 had had a previous appendicectomy, four a previous salpingectomy, three the removal of an ovarian cyst, two a cholecystectomy, and two others shortening of the round ligaments. It seems possible that adhesions following inflammation of the appendix or an appendicectomy may be responsible for damage to the right Fallopian tube, so increasing the risk of an ectopic pregnancy on that side.

The intravenous use of fluids to overcome shock and to make good loss of circulatory blood volume is important in treatment. Thirty-two of the 48 patients were given transfusions, blood being used for all of them, alone in 23 cases, in combination with serum in eight cases and with glucose-saline in one case. Fourteen of these women had transfusions started before going to the operating theatre. In those cases in which blood alone was given the volume administered varied from 500 to 2580 millilitres, with an average of 950 millilitres. In the combined use of serum and blood the approximate amount of serum used before operation was 500 millilitres, and this was followed by the administration of approximately 850 millilitres of blood.

There was only one death in this series, that of a patient in whom the diagnosis of ruptured ectopic pregnancy had presumably not been considered. The diagnosis was not established until the patient came to autopsy.

Post-operative complications included one case of intestinal obstruction due to adhesions; the abdomen was reopened and an uneventful recovery ensued. Fifteen patients had mild pyrexia during the first three days after operation. In several cases the pyrexia was due to a urinary tract infection and in others to mild chest complications.

The duration of the patients' stay in hospital varied with their general condition and with the honorary medical officer concerned. It ranged from eleven to thirty-five days, with an average of eighteen days.

Summary.

A series of 48 cases of ruptured tubal pregnancy treated at Sydney Hospital during the past ten years has been reviewed.

Available information is collected and observations are made on the following aspects of this condition: outstanding symptoms and signs, past obstetrical history, pitfalls in diagnosis, time interval between admission to hospital and operation, surgical treatment including resuscitation and anæsthesia, post-operative morbidity and mortality.

Acknowledgement.

My thanks are due to the honorary gynæcological staff of Sydney Hospital for their help and permission to study patients and records. Dr. Norman Rose, the medical superintendent of Sydney Hospital, has given permission for this review and for the publication of results.

THE COMPOSITION OF MATURE HUMAN MILK IN SOUTHERN TASMANIA.

By ANITA OSMOND,

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THE care of well babies in Tasmania is largely in the hands of Infant Welfare Nurses who follow the Truby King system of infant care. According to the "Guidebook for Infant Welfare Nurses" (1952), human milk has the following composition: protein 1·5%, fat 3·5%, carbohydrate 7%, Calories per ounce 20.

Divergence from this standard is regarded as abnormal in Tasmania and the mother is advised accordingly. The standard appears to be an adopted one, and the figures do not appear to correspond with any published values obtained by survey.

Various workers, investigating the nutrient content of mature human milk and the factors affecting variation in the proximate constituents, have obtained quite different mean values, as is shown in Table I.

TABLE I.

Composition of Mature Human Milk.

Investigator.	Protein. (Percentage.)	Fat. (Percentage.)	Carbohydrate. (Percentage.)
Macy (1949) and co-workers, U.S.A.	1·06 (S.D.[1] 0·46)	4·54 (S.D. 1·00)	(Determined) 7·1 (S.D. 0·4) (By difference) 6·8 (S.D. 0·6)
Wardlaw and Dart (1926), Australia.	1·41	4·95	6·46
Deem (1931), New Zealand	1·2	4·18	7·21
Clements (1949) (preferred values).	1·0	5·0	6·5

[1] Standard deviation.

It was considered that the figures accepted as the standard in Tasmania did not warrant sufficient confidence to be used as a yardstick against which individual samples of breast-milk are judged.

The present investigation was carried out to compare the level of the proximate constituents in mature human milk from healthy nursing mothers with healthy babies in southern Tasmania with the standard now in use and also with the findings of other investigators. The results obtained are significantly different from the Truby King standards for protein and fat, but agree fairly well with the experimental values obtained by other investigators.

Method.

The investigation was limited to apparently healthy nursing mothers with apparently healthy infants aged between eight and twenty-four weeks. The following arbitrary criterion for normal breast-feeding was laid down: that the mother must continue to breast-feed the child for at least three weeks after the milk sample had been taken. The mothers and the child welfare nurses were unaware of this criterion.

The mothers were recruited from child welfare centres in and around Hobart. Owing to practical difficulties connected with their homes, only a small number of the mothers asked to participate in the investigation were able and willing to take part.

A twenty-four hour sample of milk was collected from each mother at the Mothercraft Home, Hobart. All samples were collected between April 30 and August 31. The samples were taken according to the method described by Deem (1931). The method consists, in brief, of allowing the baby to feed from one breast only for the twenty-four hours, the amount of milk taken by the baby at each feed being expressed from the other breast. In practice, it was not always possible to express as much milk as the baby had taken.

The expressed milk was well mixed and an aliquot of one-fifth was taken for analysis. The aliquots were pooled and kept in a refrigerator.

Protein was estimated by the Kjeldahl method, fat by the Gerber method and carbohydrate by difference. Calcium as calcium oxide and phosphorus as phosphorus pentoxide were estimated in all but the first two samples. The caloric value was calculated by applying the following experimental values obtained by Atwater and Bryant (1899) for milk: percentage of protein multiplied by 4·25, percentage of fat multiplied by 8·81, percentage of carbohydrate (by difference) multiplied by 3·78.

Twenty-five women were included in the investigation. One result was rejected, and is presented separately,

TABLE II.

Composition of Milk from Twenty-four Southern Tasmanian Nursing Mothers.

Nutrient.	Mean per 100 Grammes.	Maximum per 100 Grammes.	Minimum per 100 Grammes.	S.E.[1] of Observations.	S.E.[1] of Mean.	95% Confidence Limits of Mean.[2]
Protein (grammes)	1·12	1·43	0·92	0·088	0·018	1·08 to 1·16
Fat (grammes)	4·52	5·95	3·25	0·68	0·14	3·16 to 4·81
Carbohydrate (grammes)	7·15	7·36	6·82	0·20	0·04	7·07 to 7·23
Calories	20·0	24·0	17·0	1·79	0·37	19·5 to 21·1
Ash (milligrammes)	198·0	217·0	179·0			
Calcium oxide (milligrammes)	33·4	43·0	25·0	5·56	1·16	31·0 to 35·8
Phosphorus pentoxide (milligrammes)	30·3	38·0	23·0	3·91	0·81	28·7 to 31·9

[1] Standard error.

[2] Mean $\pm t \times$ standard error of mean.

because the mother failed to breast-feed the baby for three weeks after the sample was taken.

Two women returned to the Mothercraft Home after an interval of several weeks to allow subsequent samples to be taken. Only the first result from each of these women is included in the mean figures for milk.

Results.

The mean values and the range for protein, fat, carbohydrate, Calories and ash in the milk of 24 nursing mothers and for calcium oxide and phosphorus pentoxide in the milk of 23 nursing mothers are presented in Table II.

The ranges within which 95% of observations might be expected to fall are presented in Table III.

TABLE III.

95% Range of Nutrients in Human Milk in Southern Tasmania.

Nutrient.	Estimated 95% Range.[1]
Protein (grammes)	0·94 to 1·30
Fat (grammes)	3·16 to 5·88
Carbohydrate (grammes)	6·75 to 7·55
Calories	16·7 to 23·8

[1] Mean $\pm 2 \times$ standard error of observations.

Table III means that 19 samples of normal human milk in every 20 might be expected to give values which fall within the limits specified.

The milk of the woman (S.K.) who was rejected because she failed to maintain breast-feeding for three weeks after the sample was taken had the following composition: protein 0·94%, fat 2·8%, carbohydrate 7·14%, ash 193 milligrammes per 100 grammes, Calories per ounce 16, calcium oxide 31 milligrammes per 100 grammes, phosphorus pentoxide 31 milligrammes per 100 grammes.

The composition of milk from two women at different times is shown in Table IV.

D.H. commented, at the time when the second sample was taken, that the milk supply appeared to be falling off. Immediately afterwards D.H. had a holiday, and at the time when the third sample was taken, she said that there appeared to be ample milk again. Two and a half ounces of milk per pound of the infant's body weight were available for the twenty-four hours when the first and third samples were collected, compared with two and a quarter ounces for the twenty-four hours over which the second sample was collected.

No relationship was found between the length of time during which the mother was able to breast feed her infant and the composition of the milk at the time when the sample was taken.

No relationship was found between the composition of the milk at the time when the sample was taken and the age of the baby. It was found that mothers under the age of twenty years had milk with a lower content of fat than the older mothers, as is shown in Table V.

These figures are not significant. No relationship could be found between the age of the mother and the level of the other nutrients in the milk.

No relationship was found between parity and the composition of the milk.

The mothers included in the investigation commenced weaning when their infants were at the following ages: forty weeks, two cases; thirty-five to thirty-nine weeks, two cases; thirty to thirty-four weeks, seven cases; twenty-five to twenty-nine weeks, five cases; twenty to twenty-four weeks, three cases; fifteen to nineteen weeks, three cases.

Two mothers were still feeding their infants at twenty-nine and thirty weeks respectively at the time when this paper was written.

Quantity of Milk in the Breasts.

Various information regarding the quantity of milk in the breasts at feeding time was recorded in connexion with the collection of the milk samples. The amount of milk in the breasts varied from feed to feed, but the variations differed from woman to woman.

Twenty-two of the women studied were feeding their babies five times daily. The data contained in Tables VI and VII were calculated for 21 of these 22 women. The remaining woman was excluded because one of the weighings of her baby was unreliable.

Table VI shows that the breasts usually contained most milk at the time of the early morning feed, and that as a general rule there was more milk in the breasts at the morning feeds than at the late afternoon and evening feeds.

Table VII shows that the largest amount of milk in the breasts at a feeding time was usually one and a half to two and a half times as great as the least amount.

TABLE IV.

Composition of Milk from Two Women at Different Times.

Woman.	Protein. (Percentage.)	Fat. (Percentage.)	Carbohydrate. (Percentage.)	Calories. (Per Ounce.)	Ash. (Percentage.)	Calcium. (Percentage.)	Phosphorus. (Percentage.)
B.S. 1	1·11	4·80	7·10	21	0·193	0·043	0·031
B.S. 2	1·00	4·35	7·11	20	0·191	0·032	0·028
D.H. 1	1·05	4·55	7·10	20	0·204	—	—
D.H. 2	0·90	3·30	7·26	17	0·201	0·028	0·029
D.H. 3	0·92	5·10	6·93	21	0·202	0·035	0·030

The variations recorded in Tables VI and VII could not be correlated in any way with either the age or the weight of the infant.

Discussion.

The results presented in Tables II and III and the values obtained by other investigators, as shown in Table I, suggest that the Truby King standards for the composition of human milk (protein 1·5%, fat 3·5%, carbohydrate 7%) are not representative of average human mature milk.

TABLE V.

Mother's Age in Relation to the Fat Content of the Milk Sample.

Age in Years.	Number of Samples.	Average Fat Content. (Percentage.)
Under 20	4	4·34
20 to 24	12	4·53
25 to 29	6	4·47
30 to 39	1	4·90
40 and over	1	5·00

The findings of this investigation correspond very closely with the findings of Macy in the United States (Table I) and fairly close with those of Deem in New Zealand (Table I). There appears to be no strong evidence that the milk of women of European stock varies, to any notable extent, according to the country of residence. The findings of Wardlaw and Dart (Table I) cannot be compared with the results of the other investigations, because their assays were carried out on milk collected at the 10 a.m. feed. That there is a diurnal variation in the fat content of human milk is well known. Deem (1931) finds fat at its highest level at the time of the 10 a.m. feed. Gunther (1952) believes that the highest fat content occurs around noon.

TABLE VI.

Milk Available in Relation to Feeding-Time.[1]

Feeding Time.	Most Milk.	Second Highest.	Third Highest.	Fourth Highest.	Least Milk.
Early morning	18	1	1	1	0
Mid-morning ..	1	9½	3½	3	4
Early afternoon	½	2	5½	8	5
Late afternoon	1½	5	5½	4½	4½
Evening ..	0	3½	5½	4½	7½
Total number of cases ..	21	21	21	21	21

[1] When the same amount of milk was in the breasts at two feeding times, a value of "½" was recorded for each of the two feeding times for the place gained and the subsequent place.

The results show that the proximate constituents in breast milk, when mothers are breast feeding their infants in an apparently satisfactory manner, vary over a wide range. Workers for whom the level of the proximate constituents in human milk is of practical importance would be assisted by two sets of figures—firstly, mean values, and secondly, the normal range of values. A 95% range, as calculated for this investigation in Table III, might be used as a suitable normal range.

The data presented in Table IV confirm the observation that mature milk from any one woman has not necessarily an approximately constant protein, fat and carbohydrate content. Under the circumstances, the analysis of an isolated twenty-four hour sample of milk from a nursing mother has a very doubtful value as far as practical application in infant feeding is concerned.

According to Wardlaw and Dart (1926), who collected milk at the 10 a.m. feed, the milk of young women is richer in fat than that of older women. The findings of this investigation suggest that, if milk composition is affected by age, the milk of very young mothers is poor in fat.

The data contained in Tables VI and VII support the view that a test feed of one feeding period has a very doubtful value. A test feed is a device commonly used in child welfare work to determine the adequacy of the quantity of breast milk available to a baby. The baby is weighed before and after a feed, the difference in weight corresponding to the amount of milk taken. Two types of test feed are employed. The first extends over one feeding period only, usually the mid-morning or the early afternoon feed. The second extends over all feeding periods for twenty-four hours. It is recognized that the latter provides more reliable information. It is a matter of conjecture how much subsequent twenty-four hour test feeds may vary from each other.

TABLE VII.

Milk in the Breasts at Feeding Time: Largest Amount as a Multiple of the Least.

Range of Largest Feed Divided by Smallest Feed.	Number of Cases.
1·1 to 1·5	2
1·6 to 2·0	10
2·1 to 2·5	7
2·6 to 3·0	0
3·1 to 3·5	0
3·6 to 4·0	1
7·1 to 7·5	1

Deem (1931) holds that the dietary intake of fat affects the level of fat in human milk. Gunther (1952) believes that, under ordinary circumstances, variations in fat intake do not affect the fat content of human milk. All milk samples, in this investigation, were collected in the late autumn and winter, when the fat consumption might be anticipated to be slightly higher than during the summer months. The possibility that lower values for fat might have been obtained if the investigation had been carried out during the summer months cannot be excluded.

Summary.

1. The protein, fat, carbohydrate, calcium and phosphorus contents and the caloric value of mature milk from 25 apparently healthy nursing mothers in southern Tasmania have been determined.

2. The following calculations were made on the results: mean values, standard errors of the observations, standard errors of the means, 95% confidence limits for the means and 95% ranges of values.

3. The results suggest that at least one standard used in Australia for the level of the proximate constituents in human milk is not representative.

4. It was shown that mature milk from the one nursing mother does not necessarily maintain an approximately constant composition.

5. Milk from the younger women who participated in the investigation tended to have a lower than average fat content. There was no relationship between the age of the mother and the level of the other constituents measured.

6. Data collected incidental to the investigation support the view that a test feed of one feeding period has a very doubtful value.

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References.

ATWATER, W. O., and BRYANT, A. P. (1899), "Discussion of the Terms—Digestibility and Fuel Value", Twelfth Annual Report of the Storrs Connecticut Agricultural Experimental Station, 69.
CLEMENTS, F. W. (1949), "Infant Nutrition, Its Physiological Basis", Wright.
DEEM, H. E. (1931), "Observations on the Milk of New Zealand Women", *Arch. Dis. Childhood*, 6 : 53.
GUNTHER, M. (1952), "Composition of Human Milk and Factors Affecting It", *Brit. J. Nutrition*, 6 : 215.
MACY, I. G. (1949), "Composition of Human Colostrum and Milk", *Am. J. Dis. Child.*, 78 : 589.
ROYAL NEW ZEALAND SOCIETY FOR THE HEALTH OF WOMEN AND CHILDREN INCORPORATED (1952), "Guidebook for Infant Welfare Nurses", 20.
WARDLAW, H. S. H., and DART, E. E. P. (1926), "The Milk of Australian Women", *Australian J. Exper. Biol. & M. Sc.*, 3 : 129.

Reports of Cases.

A CASE OF DOUBLE PERSONALITY.

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THE terms "double personality" and "multiple personality" are used with varying connotations in the psychiatric literature. In one sense they are employed with reference to extreme states of dissociability, in which two or more distinct personalities coexist in the one individual, with one personality becoming dominant for what may be an extremely brief period, only to be replaced by another personality, the whole state being easily influenced and probably in part created by hypnotic suggestion; the classical example in this context is that of Morton Prince's famous patient, popularly known as "Sally Beauchamp". In a second usage, the term "double personality" is applied to cases in which total amnesia develops for the whole of the past life of the individual, and an entirely new personality arises from the ruins, which may be sustained for months or years, frequently terminating in sudden and total recall of the original life history of the subject with or without complete amnesia for the prolonged "fugue" episode; the case of the Rev. Ansell Bourne described by James is typical here. The case to be described falls into this latter category, and is considered worth reporting in view of its unique features and the rarity of such phenomena outside the realms of romantic fiction.

Clinical Record.

The patient was a man, aged forty-one years when he was first examined at Broughton Hall Psychiatric Clinic in April, 1951, at which time he told a remarkable story. He had been christened A.N.F., being born in England, the youngest of five surviving children of a manager of a cooperative store. His father, since dead, was affluent and indulgent, but had made the greater part of the patient's childhood memories unhappy by his recurrent alcoholic excesses and the frequent quarrels which arose in the family on this account; his mother, despite a certain shrewdness which enabled her to manage a separate business of her own, was inclined to dabble in spiritualism, occult philosophy and fortune-telling. The patient had one elder brother who was killed in World War I, and three elder sisters, one of whom was reported to be severely maladjusted.

He was sent to expensive schools and did outstandingly well, but on leaving school at the age of sixteen years he had little idea of what he desired for his future, so that after several unsatisfactory attempts at employment he migrated to Australia at the age of seventeen years and for two years did farm-labouring and station work in various parts of northern Queensland. At this time his father died and he returned to England temporarily, and while on his way home he formed an attachment to a German girl, Anna, who was some eight years his senior and of considerably lower status both socially and intellectually. They were married at a registry office in London when he was aged twenty-one years, and together returned to Queensland; they arrived in the middle of the financial depression and went through a period of considerable economic hardship before settling with one of his wife's brothers, who had a fairly prosperous sugar-cane farm. His wife gave birth to a stillborn male and then later to a healthy daughter; but the patient realized increasingly that the marriage had been a most unfortunate one owing to their great temperamental unsuitability; he gradually reached a stage of complete frustration, which is best exemplified by one of his many dreams of that period: "I used to dream I was lying with a skeleton and would wake up screaming." He suffered intense feelings of self-reproach because of conscious feelings towards her of what amounted to hatred, and further because he felt he was using her purely as a sexual object without more satisfactory aims. Prior to his marriage his sexual life seems to have been uneventful, with the customary period of adolescent onanism and some heterosexual experience in his late teens without excessive guilt.

In 1934, having been married four years, he felt that he might find satisfaction and comfort in Roman Catholicism, which was his wife's religion, and accordingly he took instruction at Ravenswood. At about the same time he suffered a scalp wound from an axe injury, and was subject to recurrent severe headaches over the next twelve months.

In the early part of 1935 he was thrown from a horse and struck his head heavily on a log; apparently unconscious, he was found by his wife's brother and taken to the house. His memories from that time on became exceedingly confused and unreal; he had a vague recollection of being nursed at home, and of sitting up in bed, singing deliriously in a high falsetto and claiming that he could see visions of angels. Equally vaguely he had an impression of being in the Reception House in Townsville, but from that time on the whole past life of A.N.F. was blotted out, not to return for thirteen years.

At his original interview his next recollection was of being in the Royal Melbourne Hospital in January, 1936; he can recall the date with accuracy because of the fact that the flags were flying at half-mast on account of the death of King George V. When he was found in Melbourne he was dressed in a cloth cap, blue sweater and trousers and had a French coin in his pocket; in hospital he gave his name as "Léon Daudet" but could give no account of how he had come there. (Records of the Royal Melbourne Hospital confirm the admission of a French sailor with this name at that time, and state that he was complaining of severe headaches following an alleged head injury twelve months previously.) He could speak no English at that time, but spoke fairly fluent French, and in view of this circumstance and his remarkable attire he was presumed to have deserted from a French ship. After treatment at the hospital he was transferred to a convalescent home, in which situation he had a remarkable sensation; he became gradually convinced that he was an Englishman, yet when he tried to convey this fact to a patient in the next bed he could speak only in French—"*je suis anglais*". The police advertised widely and a French woman claimed him as her son, only for the claim to be disproved.

Finding life in the home tedious and restricted, he made his escape from there and in gradual stages moved westward to Adelaide, and shortly afterwards to Kalgoorlie and later Perth. During this period his knowledge and command of English gradually returned, although at first he was speaking it with a pronounced French accent, and simultaneously his mastery of French disappeared. Registering for employment in Adelaide, he realized he would have to give a name, and he christened himself H.R.Y., the name which he has borne since and under which he is still employed. He can give no explanation of the reasons underlying his selection of this particular name.

The years 1936 to 1938 he spent in various rural occupations in the Western Australian country districts, and over this period he constructed an elaborate story of his past life which was in fact completely fictitious, but which at the time he believed implicitly. Deep in his mind he had the knowledge of having once been married, and gradually he came to believe that he had recently emigrated from France, whence he had gone from England (taking the name of Léon Daudet) to help in work against the Nazi movement; he believed that his wife had committed suicide and that he had a young daughter Anne who was being held a prisoner by the Gestapo.

During 1937 he was twice admitted to the Reception House in Perth, and the records show that he gave a long history as summarized above of having been engaged in foreign political work in Europe; on the second admission he had a "query amnesia" and had travelled 280 miles to seek admission as a voluntary patient. He showed no psychotic features on either admission and was labelled "psychasthenia".

In the early part of 1938 he married a young Englishwoman who was at the time living in Perth; she accepted without question his new and elaborate personality. Shortly afterwards he entered the advertising field, where he has remained since save for the interruptions of war service, and has held increasingly important posts. He joined the Australian Imperial Force in 1941 and was discharged in 1945, but saw no overseas service, advancing to the rank of sergeant in the Electrical and Mechanical Engineers, a position which he disliked intensely; during his period of service he had two confusional episodes in which he wandered away from his unit and was taken to a general hospital. On each occasion he was confused and amnesic, but after a few days his mental state cleared spontaneously; he attributed his illness to ill-treatment received in German concentration camps nine years previously, and was considered to be suffering from hysterical amnesia.

In the years 1945 to 1948 he steadily advanced himself in his profession, though showing alternating phases of depression and elation, until in 1948 he attempted suicide after a series of disagreements with his wife and her discovery of a childishly promiscuous extramarital liaison. It was at this period that the crisis of his life began. With a strong feeling of the futility and selfishness of his previous existence he decided to embrace Roman Catholicism, and to this end he consulted an acquaintance who was a Roman Catholic priest and began to receive instruction in the faith. Gradually glimmers of light began to illuminate the fabrications of his past, and after one day when he had explained in great detail the whole of his life history as H.R.Y. he realized with sudden intuition that it was not true. About the same time, the fact that he had been previously instructed in the faith seemed to come slowly up into his mind, and, without clearly knowing why, he suggested that it had been in Ravenswood. Once again his original name of A.N.F. came indistinctly to him, and, acting on these clues, the perplexed priest wrote to his opposite number in Ravenswood. The reply put the matter beyond doubt: A.N.F. had indeed received instruction in that district, and furthermore shortly afterwards had disappeared without trace, leaving behind a wife and daughter and a son who had been born shortly after his departure.

Retaining his assumed name of H.R.Y., he continued his religious instruction, during which the true facts of his existence gradually made themselves known to him. The difficulties of the situation once the pattern became complete were appalling, and there is no doubt that his acceptance of and adjustment to them are due in large measure to the genuine fervour and sincerity of his present devout religious beliefs and observances. Although the law has assured him that under the circumstances his bigamous marriage will not be attacked, he is faced with financial difficulties in that he feels morally bound to support his first wife, who still lives in Queensland with his two children, and in addition his religious convictions have not permitted him to live in a normal marital relationship with his second wife, since the revelation of his past has become complete, and they live together in total sexual abstinence. Two children of his second marriage further complicate the position.

He came under observation at the clinic owing to the depressive phase of his mood swings, which have been in evidence for a large part of his life in both personalities. On his admission he was very depressed, with failure of concentration and complete lack of energy, and he was withdrawn and emotional. No delusional ideas were expressed and no mental confusion was present. He responded dramatically to six electro-convulsive treatments and has been steadily at his usual employment since.

Comment.

It is of considerable interest that this patient has been recently examined at the clinic again at our request, and was able spontaneously to fill in some of the gaps in his story. He could recall some of the circumstances of his abrupt departure from his brother-in-law's house; he remembers leaping from his sick bed, clasping his baby daughter in his arms and running wildly across the paddocks, finally dropping the child when he was ordered to do so by his brother-in-law, who was in hot pursuit. He can describe in some detail the circumstances of his incarceration in the Townsville Reception House, and has fragmentary memories of hanging about the docks in that town subsequently, becoming involved in political agitation and joining the local branch of the Communist Party. He has vague recollections of his journey south, including an ever-present sense that he was "running away", though he was not clear from what.

There can be little doubt that this history represents an hysterical dissociation of remarkable duration, with clear and unmistakable motivating factors into which in fact the patient shows considerable spontaneous insight. Whether it is regarded as an "hysterical fugue", an extremely prolonged "hysterical amnesia" or a "double personality" is largely a matter of terminology and semantics. While his head injury can be regarded as a precipitating cause, it is untenable that the whole reaction is on an organic basis; particularly in the vagueness of its onset, the severe conflict situation which it attempted to resolve and the shadowy recall of isolated events during its early stages, the whole illness in classically psychoneurotic. Though the possibility of simulation needs to be considered, it must not be forgotten that hysteria is invariably a motivated illness, and that in this particular example the motivation was extremely strong and was at the shallowest level of unconsciousness; further, the possibility of simulation, even by a hysteroid personality with pronounced histrionic tendencies, over such an extensive period and including ten years of the intimacy of married life, cannot be envisaged.

His second wife describes his general behaviour in both personalities as hyperactive; he has a happy, enthusiastic nature with immense and almost inexhaustible capacity for hard work. It would thus appear that there is a true cyclothymic personality in addition to the complex hysterical picture described.

While it is more than possible that a fuller understanding of the early years of his "second personality" could be obtained under hypnosis and a deeper understanding of the motivations of his illness revealed and shared with the patient, this has not been attempted and indeed it would seem extremely unwise that this should be done. He has at present found through his religion a more comfortable adjustment than could be given him by any psychotherapeutic technique which, however much it may increase his insight into his own motivations, could never alter the unpleasant realities of his present existence.

Summary.

An unusual case of hysterical dissociation is described in detail, in which an independent personality was established for a period of approximately thirteen years. Total recall of the subject's original personality returned spontaneously without significant residual amnesia for his prolonged fugue. It is of interest that in both personalities

pronounced cyclothymia has manifested itself, and recently he has made an excellent recovery from a typical depressive illness with electro-convulsive therapy.

Acknowledgements.

I acknowledge gratefully the cooperation of the Royal Melbourne Hospital, the Repatriation Commission, and Dr. W. B. C. Gray, of Heathcote, Western Australia, in making available their records of this case. This paper is published with the permission of the Inspector-General of Mental Hospitals, New South Wales.

TRAUMATIC VAGINAL HÆMORRHAGE.

By T. I. COPE,
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TRAUMA is an uncommon cause of profuse vaginal hæmorrhage except during parturition. When this cause is inapplicable, we often find that the patient presents under emergency conditions, in which the severity of the hæmorrhage and a misleading history together with an inadequate examination under difficult conditions lead to an erroneous diagnosis.

The text-books mention that the vagina may be ruptured as the result of accident, criminal abortion or even normal coitus, but do not point out the possible severity of hæmorrhage which may occur from a small laceration of the vaginal wall. Most of the cases reported in the literature are of individual instances of coital rupture of the vagina.

I am reporting four cases of profuse vaginal hæmorrhage occurring as a result of rupture of the vaginal vault. Two of these cases followed rupture of the vagina during intercourse, and the other two cases are unusual in that they occurred as a result of self-inflicted trauma in women with hysteroid tendencies.

Clinical Records.

CASE I.—Mrs. C.C., aged twenty-four years, an Italian migrant, unable to speak English, presented herself as an emergency at the Royal Hospital for Women at 11 p.m. on August 29, 1952, complaining of profuse vaginal hæmorrhage. Her husband had arrived home from abroad that day, and the bleeding had followed intercourse that evening.

On examination of the patient, she was pale and shocked, and her pulse was rapid; her blood pressure was 95 millimetres of mercury, systolic, and 60 millimetres, diastolic, and she was bleeding profusely from the vagina. On speculum examination of the vaginal vault, a transverse laceration about one inch long was found in the right lateral fornix. The vagina was packed and this controlled the hæmorrhage. During the examination the patient fainted, and a transfusion of serum and then blood was given under positive pressure. In all, one litre of blood was given. The gauze was removed on September 1, and she was allowed out of bed. As no further hæmorrhage had occurred she was discharged from hospital the following day, with instructions regarding the prevention of a recurrence of such hæmorrhage.

CASE II.—Mrs. M.E., aged fifty-nine years, was admitted to the Royal Hospital for Women at 2 a.m. on August 27, 1952. She had been referred to the hospital by her local doctor with a provisional diagnosis of carcinoma of the cervix. She complained of profuse vaginal hæmorrhage accompanied by lower abdominal pain, which had commenced suddenly about midnight. She felt weak and dizzy, but had no pain on her admission to hospital.

On examination of the patient, she was under the influence of alcohol, pale, shocked and very restless. Her blood pressure was 70 millimetres of mercury, systolic, and 50 millimetres, diastolic. There were no abnormal abdominal findings. On vaginal examination, there was profuse vaginal hæmorrhage; the cervix and uterus were palpably normal, but a full examination of the cervix and vaginal vault could not be made because of the continued severity of the hæmorrhage. The vagina was packed and a transfusion of 500 millilitres of serum and one litre of blood was given.

On August 28, thirty-six hours later, an examination under anæsthesia was carried out. A small senile cervix and fibrotic post-menopausal uterus were found; in the posterior fornix there was an irregular laceration about one inch long. The vaginal mucosa was lacerated, the traumatized deep tissues being revealed, but there was no rectal or intraperitoneal involvement. She was discharged from hospital the following day with similar instructions as in the first case.

CASE III.—Mrs. A.S., aged thirty years, was admitted to the Royal Hospital for Women on June 3, 1952, with the provisional diagnosis of secondary hæmorrhage following biopsy of the cervix. She had been admitted to a private hospital on May 29, six days previously, where she had had a biopsy of the cervix performed to exclude carcinoma. She had been discharged and was at home when vaginal bleeding commenced. She had been examined by a local doctor, who had packed the vagina and controlled the bleeding. Her presenting symptom was irregular vaginal bleeding of six weeks' duration. Her last menstrual period had occurred on May 3; she had a regular thirty-two day cycle, the periods lasting for seven or eight days, and she bled excessively with her menstrual periods. She had been married for nine years, and had had one child which had died at the age of six years, in 1950. She said that she had had a number of miscarriages, the pregnancies being of about three months' duration. She had an adopted child. She had had a diagnostic curettage and two operations, when one ovary was excised and some ovarian cysts were removed.

On her admission to the Royal Hospital for Women her general condition was satisfactory. There was slight lower abdominal tenderness upon deep palpation, and as the vaginal packing had stopped the bleeding it was left in place, and vaginal examination was deferred. Forty-eight hours later, on June 5, the gauze was removed, but profuse bleeding commenced. An examination under anæsthesia was performed, and on the anterior vaginal wall extending onto the right lateral vaginal wall at the cervico-vaginal junction there was an irregular bleeding area of thickened tissue about three-quarters of an inch in diameter. A biopsy was taken from this area and hæmostasis was secured. She was given a transfusion of one litre of blood. The pathologist reported pronounced chronic inflammatory changes in the connective tissue beneath the epithelium, with no evidence of malignant disease. Further investigations were carried out. The patient's hæmoglobin value was 12·2 grammes *per centum* and her blood group was A(II) and she was Rh-positive; the white blood cells numbered 19,000 per cubic millimetre, 91% being neutrophile cells, 5% lymphocytes, and 4% eosinophile cells. The Kline test, the Wassermann test and the gonococcal complement fixation test all produced negative results. The chest X-ray film revealed no abnormality.

Hæmorrhage recurred intermittently, and on one occasion a fork was found in the patient's bed. This made us suspect that she was causing the vaginal hæmorrhage herself, although she denied this. On June 16, a T-binder was applied, and whilst this remained in place hæmorrhage did not recur. During her stay in hospital she was most unconcerned and indifferent about the vaginal hæmorrhage. She was often emotional and endeavoured to impress the nurses and staff to gain sympathy. She exemplified "*la belle indifférence*" of the hysteric. She left hospital against medical advice on July 1.

She was readmitted to hospital on August 22 with profuse vaginal hæmorrhage. On this occasion she was weak from blood loss, and on examination of the vagina there was an area about a quarter of an inch in diameter in the right lateral fornix with some blood clot attached. The previous bleeding area had healed. She was again given a transfusion, on this occasion of one and a half

litres of blood, and on August 25, when the bleeding had abated, she again left hospital against medical advice.

CASE IV.—Miss C.F., aged thirty years, was admitted to Saint Vincent's Hospital in March, 1950, having been referred from a country centre for investigation and treatment because of intractable profuse vaginal hæmorrhage. She had profuse vaginal hæmorrhage associated with lower abdominal pain of such a degree that she had undergone a subtotal hysterectomy in 1947, and an amputation of the cervix in 1948, in an endeavour to control the hæmorrhage. She had been in hospitals for almost three years when she was admitted to Saint Vincent's Hospital.

On her admission to hospital, the patient's general condition was satisfactory, although she was pale. On abdominal examination she had a granulating area at the upper end of a sub-umbilical incision, and some lower abdominal tenderness. Vaginal bleeding was occurring. When examination under anæsthesia was carried out, there was found on the vaginal wall a small ulcer, about a quarter of an inch in diameter, and examination of the vaginal vault revealed mucosal breakdown and polypoidal masses. Biopsy of the vaginal vault showed vascular fibrous tissue capped with squamous epithelium. There was some inflammatory change, but no evidence of malignant disease. When the abdominal wound was covered it healed slowly, and when the vagina was packed the vaginal hæmorrhage ceased. On May 18 the hæmorrhage recurred, and further examination under anæsthesia was performed. There was a ragged laceration on the posterior vaginal wall, while the whole of the vaginal vault was covered with granulations. On this occasion she was given one litre of blood.

A full blood count revealed microcytic normochromic anæmia, but no blood dyscrasia.

Socially and mentally the patient was immature and considered to have an inadequate personality. She had been engaged to be married at the age of twenty-one years, but had broken off the engagement because of "dysmenorrhœa and lower abdominal pain". She had spent the last three years in bed, being contented to sit in bed to knit and read. The knitting needles were the implements suspected of being used to cause the vaginal hæmorrhage. She was eventually discharged from hospital on June 2, when the bleeding had abated.

Commentary.

These four cases of rupture of the vagina following trauma all illustrate the possible severity of hæmorrhage which may occur from a small laceration of the vaginal wall.

I have been unable to find references to similar cases of vaginal hæmorrhage associated with hysteria in the literature.

In the case of Mrs. A.S., it is probable that the avoidance of sexual intercourse was the original factor causing the anxiety state, although I was unable to interview the husband to confirm this. The vaginal hæmorrhage was a particularly appropriate physical sign to symbolize her repressed wish.

In the case of Miss C.F., a more general immaturity of her personality led to the vaginal hæmorrhage. She was unable to adapt herself even to the necessities of daily life, and having found such a means of escaping her responsibilities she was prepared to vegetate.

With regard to rupture of the vagina following coitus, most of the reports are of isolated cases.

There have been four other cases of post-coital vaginal rupture in the records of the Royal Hospital for Women since 1947; one was associated with a vulval hæmatoma and two of the four patients needed blood transfusions.

Diddle (1948) reports two cases and has reviewed 133 major tears of the vaginal vault resulting from coitus, which have been recorded in the last seventy-six years. He found that the most common predisposing factors were the following: (i) experience of first intercourse—in 34 of 133 cases the tear was virginal; (ii) first intercourse *post-partum* or *after an abortion* (13 of the 133 cases); (iii) post-menopausal or pre-pubertal intercourse with consequent disproportion and abnormal positions (eight cases were post-menopausal, four subjects were aged under twelve years); (iv) undue violence or brutality on the part of the male (two cases of rape).

Two-thirds of the tears involved the posterior wall or lateral fornix, and there were only four on the anterior wall. Parametrial extension occurred 21 times. The peritoneum was exposed 30 times, but broken only six times. The rectum was injured in seven cases and the bladder in one case.

The usual symptom was profuse vaginal hæmorrhage sometimes associated with lower abdominal discomfort or pain.

A point specially mentioned in diagnosis is that vaginal lacerations of the vault may be overlooked because of inadequate visualization.

Surgical repair of the lacerations is mentioned in cases reported by Strasheim (1951), by Nicholls (1946) and by Speert (1947).

In 22 of the 133 cases reviewed by Diddle the patient died. Five of the 22 subjects were young girls not fully mature, and two were women past the menopause. Seven died from sepsis and two from shock due to hæmorrhage. Whether sepsis or shock accounted for the remaining deaths was not ascertained.

There is a report of a case by Lash (1948) of a woman, aged fifty-seven years, who had eight children, but had not had intercourse in the previous twelve months; rupture of the posterior fornix occurred and a loop of small bowel came down into the vagina. In 1899 Neugebauer reviewed 159 cases gathered from the publications, and in only four cases of 38 of lacerations in the posterior fornix was the pouch of Douglas entered, and only one case of prolapsed bowel was recorded.

The other reports (Blair, D'Arcy, Stokes, Frank) are of isolated cases.

Summary.

Four cases of rupture of the vagina with profuse vaginal hæmorrhage are reported. Coital rupture of the vagina is uncommon, but not rare, and it is most important that a careful full examination be made of the vaginal vault and cervix in all cases of profuse vaginal hæmorrhage. Two cases of hysteria associated with profuse vaginal hæmorrhage are reported.

Acknowledgements.

I wish to thank Dr. D. R. Sheumack and Dr. R. B. Kendall, of the Royal Hospital for Women, and Dr. D. Foy, of Saint Vincent's Hospital, Sydney, for permission to report these cases, and Dr. D. R. Sheumack for the help he has given me in the preparation of this paper.

References.

"DISEASES OF WOMEN", by ten teachers under the direction of C. White, edited by C. Barkeley, C. White and F. Cook (1942), Seventh Edition.

BLAIR, R. (1925), "A Fatal Injury of the Vagina", *Brit. M. J.*, 1: 828.

D'ARCY, C. E. (1919), "Two Cases of Lacerated Vagina During Coitus", M. J. AUSTRALIA, 1: 172.

DIDDLE, A. W. (1948), "Rupture of the Vaginal Vault During Coitus", *West. J. Surg.*, 56: 414.

FRANK, R. T. (1948), "Dyspareunia: a Problem for the General Practitioner", *J.A.M.A.*, 136: 361.

LASH, S. (1948), "Perforation of the Posterior Fornix and Pouch of Douglas During Coitus", *Brit. M. J.*, 1: 786.

NICHOLLS, R. B. (1946), "Rupture of the Posterior Vagina During Normal Coitus", *Am. J. Obst. & Gynec.*, 52: 500.

SPEERT, H. (1947), "Vaginal Lacerations Resulting from Coitus", *Am. J. Obst. & Gynec.*, 53: 177.

STRASHEIM, E. A. (1951), "Vaginal Vault Injury During Coitus", *South African M. J.*, 25: 800.

STOKES, E. H. (1919), "A Case of Lacerated Vagina During Coitus", M. J. AUSTRALIA, 1: 111.

Notes on Books, Current Journals and New Appliances.

Hypnosis in Medicine. By A. Philip Magonet, B.Sc., M.D., C.M.; 1952. London: William Heinemann (Medical Books), Limited. 7½" × 5", pp. 114. Price: 9s. 6d.

THE author, who is the president of the Medical Hypnosis Association, has written this small book to encourage doctors and medical students to explore the field of hypnosis. He points out that the technique is easily learned and that hypnosis can be achieved only with the intelligent cooperation of the patient—well-balanced, sensible and intelligent people make the best subjects. He describes the technique and discusses various conditions (with case histories) in which it may be used.

Transactions of the Fifth American Congress on Obstetrics and Gynecology. Edited by George W. Kosmak, M.D.; 1952. Sponsored by the American Committee on Maternal Welfare, Inc. Held in Cincinnati, Ohio, March 31-April 4, 1952. Published as a supplementary volume to the *American Journal of Obstetrics and Gynecology*, Volume 64A, December, 1952. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 10¾" × 7", pp. 616, with 39 illustrations. Price: £6 11s. 3d.

THIS is a beautifully produced volume and reflects credit on the committee which sponsored it. The congress attracted a membership of over 4000 persons. The president was Dr. Fred L. Adair, of the American Committee on Maternal Welfare. The volume contains some 88 chapters on almost every subject in obstetrics and gynæcology. One or two of the more important subjects may be noted. There is a study by four authors of ten thousand neonatal autopsies in Chicago. An investigation is reported into the provision of neonatal care for persons in the low-income groups. Uterine carcinoma was discussed by leading authorities and other subjects included sterility, vulvar lesions, urinary incontinence, uterine bleeding and endometriosis. Three symposia dealt with dystocia, educational and social aspects of maternal care, and fœtal wastage. This is a volume of first-rate interest.

The Will to Live. By Arnold A. Hutschnecker, M.D.; 1952. London: Victor Gollancz, Limited. 7½" × 5¼", pp. 286. Price: 13s. 6d.

THIS book is to a considerable extent a development of Freud's last theory, that of the action and interaction in man of "two basic, all-powerful drives, the creative instinct and the destructive instinct". The corollary is that when the destructive instinct gains over the creative instinct, illness is the result. This the author seeks to apply to the understanding of illness in the light of current concepts of psychosomatic medicine, the emphasis being on encouraging the "will to live" and discouraging the "death wish". Hutschnecker acknowledges the fact that many of Freud's own disciples still reject the concept on which he builds his thoughts, but to him it is "a master key to man's most baffling and mysterious behavior". It must be admitted, if questions of psychological dogmatism are put aside, that Hutschnecker's development of his theme contains much common sense and insight into human behaviour in sickness and in health. Any thoughtful observer of his fellow men, whether doctor or layman, will find the book stimulating—it is written in non-technical terms without being condescending. The main possible criticism is that enthusiasm for his theme makes the author anticipate too much—or so it will appear to many people. Psychological conflict and maladjustment are not the only factors in individual illnesses or international tension, important and regrettably neglected though they may be. Even in the ranks of the psychiatrists and academic psychologists there is sharp division on their capacity to transform the human race and its behaviour.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Mental Health and Hindu Psychology", by Swami Akhilananda; 1952. London: George Allen and Unwin, Limited. 9" × 6", pp. 250. Price: 16s.

Deals with psychology and religion.

"Different Forms of Signalling Employed by the Nervous System", by Bernhard Katz; 1952. London H. K. Lewis and Company, Limited. 10" × 6½", pp. 18. Price: 4s.

An inaugural lecture delivered at University College, London, on January 31, 1952.

"An Introduction to Social Biology", by Alan Dale, B.Sc.; 1953. London: William Heinemann (Medical Books), Limited. 9" × 6", pp. 442, with 199 illustrations. Price: 21s.

The book had its origin in a series of discussions held with the combined sixth forms of a large boys' secondary school.

"Liver Injury: Transactions of the Eleventh Conference, April 30 and May 1, 1952, New York", edited by F. W. Hoffbauer, M.D.; 1953. New York: Josiah Macy Junior Foundation. 9½" × 6½", pp. 266, with 96 illustrations. Price: $4.00.

The subject was discussed in five sections, and those taking part have contributed introductory remarks.

"Radiations and Living Cells: An Introduction to Radiation Biology, in which the Action of Penetrating Radiations on the Living Cell is Described, with Special Reference to the Effect on Cell Division in Human Tissues", by F. G. Spear, M.D., M.A., D.M.R.E.; 1953. London: Chapman and Hall, Limited. 7½" × 6", pp. 234, with 60 illustrations. Price: 18s.

One of the "Frontiers of Science Series", edited by Dr. Bernard Lovell.

"Medical Electricity for Massage Students", by Hugh Morris, M.D., D.M.R.E.; Fourth Edition; 1953. London: J. and A. Churchill, Limited. 9" × 6", pp. 672, with 113 illustrations. Price: 27s. 6d.

The third edition was published in 1946.

"La Peau", by Paul Blum, M.D.; 1953. Paris: Presses Universitaires de France. 7" × 5", pp. 128, with three text figures.

The author has not tried to write a dermatological treatise but to discuss the nature and function of the skin. Intended for the general public.

"Modern Treatment Year Book, 1953: A Year Book of Diagnosis and Treatment for the General Practitioner", edited by Cecil Wakeley, Bt., K.B.E., C.B., LL.D., M.Ch., D.Sc., F.R.C.S., F.R.S.E., F.R.S.A., F.A.C.S., F.R.A.C.S.; 1953. London: Published for The Medical Press by Baillière, Tindall and Cox, Limited. 9" × 6", pp. 372, with 88 illustrations. Price: 21s.

This volume contains thirty-eight articles on a variety of subjects.

"Biological Hazards of Atomic Energy: Being the Papers Read at the Conference Convened by the Institute of Biology and the Atomic Scientists' Association, October, 1950", edited by A. Haddow; 1952. Oxford: The Clarendon Press. Melbourne: Oxford University Press. 9½" × 6¾", pp. 246, with 94 illustrations and text figures. Price: 63s.

Intended for both scientists and laymen.

"Parkinson's Disease and its Surgical Treatment", by Leslie C. Oliver, F.R.C.S. (England); 1953. London: H. K. Lewis and Company, Limited. 8¼" × 6", pp. 96, with 12 illustrations. Price: 12s. 6d.

The author has made a detailed study of 300 patients suffering from the Parkinson syndrome, 93 of whom were selected for operation.

"Prescription for Rebellion", by Robert Lindner; 1953. London: Victor Gollancz, Limited. 8" × 5¼", pp. 310. Price: 16s.

The author ascribes most of the ills of society to adjustment and advocates a new approach to psychology, to individual and social behaviour based upon rebellion.

"Human Blood Coagulation: And its Disorders", by Rosemary Biggs, B.Sc. (London), Ph.D. (Toronto), M.D. (London), and R. G. Macfarlane, M.A. (Oxon.), M.D. (London); 1953. Oxford: Blackwell Scientific Publications. 9" × 6", pp. 424, with three plates and 57 text figures. Price: 32s. 6d.

The authors have attempted to produce a book which will interest established workers on the subject and also be of use to the clinician.

The Medical Journal of Australia

SATURDAY, JUNE 6, 1953.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE MENTAL HOSPITAL SERVICES OF NEW SOUTH WALES.

ONCE more it has become the painful duty of this journal to draw attention to the sad and wretched condition of the mental hospitals in New South Wales. We have received the report of the Inspector-General of Mental Hospitals for the year ended June 30, 1951. This report was ordered to be printed on September 18, 1952; it was received by this journal at the end of March, 1953. Readers by this time should be quite familiar with the story of frustration to which those in medical charge of mental patients in New South Wales have for many years been subjected. Every year the Inspector-General has the same story to tell, every year he makes the same recommendations, and every year he notes that certain procedures have been authorized and have not been carried out. The public at large, which knows little about mental hospitals and their working, has no opportunity to learn what is going on, and unless newspapers and journals repeatedly draw attention to deficiencies, such documents as the Inspector-General's report remain unexplored. Only recently in the course of an action brought by a patient who claimed that he had been wrongly detained at a mental hospital, the judge was unable to allow the plaintiff to describe things which he had seen during his six months' detention and which had "upset him". The judge explained that he was sitting as a judge and not as a Royal Commissioner. It would have been interesting if it had been possible for the judge to make a different decision.

In the report under review the Inspector-General states that the congestion of mental hospitals due to overcrowding was the greatest problem with which the administration had to deal during the year. The difficulties were increased by shortages of staff, particularly in regard to female and nursing staff. The position of mental hospitals in New South Wales in the matter of overcrowding is worse now than it has been at any other time, with the exception of the war years, when one of the mental hospitals was taken over by the Army. During the year, the average number of patients resident in mental hospitals was 11,040·5. Of this number of patients approximately half were male and half were female. The overcrowding for 1950 to 1951 was 2074. In the preceding year the number of patients in excess of accommodation was 1709. To show that this kind of thing has existed for many years as a chronic festering sore on the community, it may be pointed out that the number of patients in excess of accommodation in 1930-1931 was 1454. Those concerned with social services generally are aware, but many people seem to forget, that with every increase in population additions should be made to the facilities provided for social services. The Inspector-General points out that in the year 1949-1950 the population of the State was 3,175,935, an increase on the previous year of 113,591; in this year the increase in the number of patients in mental hospitals was 138. In the year 1950-1951 the population of the State was 3,305,485, an increase on the previous year of 129,550; in this year the increase in the number of patients in mental hospitals was 513. The Inspector-General makes one pertinent observation which should give rise to serious thought. He states that if the immigration policy of the Commonwealth Government is maintained there is no doubt that the upward trend of the numbers of patients in mental hospitals will continue. (It will, we think, continue anyhow.) He sets out the number of immigrants who had been resident in Australia for less than five years and who had been admitted to mental hospitals during three different year periods. In the year 1948-1949 the number was 16, in the year 1949-1950 the number was 52, and for the year 1950-1951 the number was 124. It is interesting to note that in one institution there is no overcrowding. This is the Psychiatric Clinic at Broughton Hall, to which patients are admitted on a voluntary basis; here there is accommodation for 211 patients and those in residence numbered 180. Voluntary patients are admitted to other institutions than Broughton Hall; the total number of voluntary patients in mental hospitals on June 30, 1951, was 470. During the year 3734 persons, including inebriates and patients on leave, were admitted to the Department's reception houses. Of these, 1187 were discharged without the necessity of certification. In comparison with the previous year, these figures reveal an increase of 394 admissions and a decrease of 21 discharges.

The cost of maintenance of patients in mental hospitals is, as might be expected, increasing. The amount expended during the year under review was £2,273,183; this is an increase of £330,982 over the amount expended for the previous year. The net cost of maintaining a patient was £163 6s. 5d., which is £23 19s. 4d. above the figure for the previous twelve months. (In this computation the sum collected by the Master in Lunacy for the maintenance of patients and the amount paid by the Commonwealth Government in terms of the *Hospital Benefits Act* are disregarded.)

The present state of affairs need not be laboured; the facts stated speak for themselves. Hospitals for the treatment of patients suffering from mental disease are a necessary part of community life, and to say that the same care

must be bestowed on them as on the running of any other public institution is an understatement. Mental hospitals are shut away from the eyes of the general public and their inmates have no opportunity to criticize what is, or what is not, done for them. Were any statement to come from them, its correctness would be doubted by many people who would suggest that because they were mentally afflicted their statements would be unreliable. It is true that official visitors are appointed to these institutions, but the public never sees the reports of the official visitors; in fact, we do not know whether they make reports, or whether any reports they do make are acted upon. The only document which makes a clear statement of the matter is the annual report of the medical head of the Department. This document should be made more widely known, for in no other way will any good be achieved. Unless something is done, the overcrowding will soon be so great that admission of patients will have to be refused.

Current Comment.

THE EFFECT OF CORTISONE ON CERTAIN CARDIAC LESIONS.

THE effect of cortisone and adrenocorticotropic hormone on tissue hypersensitivity lesions of the myocardium has been well investigated, and the quantitative inhibition of inflammatory reactions has been studied and pondered. The altered collagen changes take place, but the cellular reaction is suppressed. Abner Golden and J. W. Hurst have recently made observations on a patient, aged ten years, who died from intractable cardiac failure.[1] She had suffered from rheumatic fever for six months, and had been given prolonged courses of ACTH and cortisone until a period of six weeks before her death; for the last sixteen days she received large doses of cortisone, 100 milligrammes every eight hours. At autopsy the appearance of the myocardium was unusual. The older lesions showed evidences of healing, but not more than might be found in persons who had received no cortisone. The acute lesions showed extensive degeneration of collagen, but cellular reaction was practically absent. Though cardiac lesions may be reduced experimentally there seems little evidence that the so-called natural course of the disease is altered. It may be possible, however, that suspension of hormone therapy may be followed by infiltration of inflammatory cells, after which healing may occur. Golden and Hurst suggest the possibility that a prolonged period of suppression of cellular reaction may favour reduction of the ultimate scar formation. They admit that only long-term study of the clinical progress of patients suffering from rheumatic fever and treated with these hormones can clear up the problems involved.

Somewhat related to this subject is that of the effect of cortisone upon cardiac infarction. Here we have a lesion which can be produced and studied experimentally. A. S. Johnson, S. R. Scheinberg, R. A. Gerisch and H. C. Saltzstein have published a study of experimental myocardial infarction in a series of 57 dogs, produced by ligation of the anterior descending branch of the left coronary artery.[2] High ligation and low ligation were practised in two separate groups of animals; cortisone was administered to members of each group, and another control group was observed to which no hormone was administered. When cortisone was given the administration was begun immediately the operative procedure was completed, and the further precaution was adopted of giving procaine penicillin. The animals were sacrificed after thirty days; the hearts and lungs were exposed and photographed, thoroughly studied, and examined by X rays after injection with a bismuth suspension. The most striking finding was that the size of the experimental infarcts was substantially reduced in the animals treated with cortisone. The average size of the infarcts of these dogs was 0·96 mil, whereas that of the control series averaged 7·28 mils. These figures were for the low ligations; the high ligations gave the figures of 0·141 and 18·83 mils. The mortality in the controls was 52·9%, and that in the treated animals was only 21·5%. Other effects were noted. Fibroblastic proliferation in the local areas of the infarctions was found to be less in treated animals than in the controls, and during the early stages there was some delay in healing. Post-mortem studies were carried out on the injected hearts, and it was found that interarterial coronary anastomoses were increased in the hearts of the dogs given cortisone, quite independently of the performance of coronary ligation. It appeared that cortisone produced a general effect on the heart which enhanced anastomoses throughout the vascular system of the organ. The authors believe that this anastomotic effect is responsible for the lessening of the area of infarction. These studies are of interest and suggest the possibility of using cortisone with the object of evoking a specific response in the appropriate stages of rheumatic carditis and myocardial infarction.

[1] *Circulation*, February, 1953.
[2] *Ibidem.*

SKELETAL DISORDERS IN CHRONIC RENAL FAILURE.

RENAL DISEASE, which has attracted a great deal of clinical and laboratory attention during the last generation, is not important merely in its acute forms. When the condition of kidney function is such that the patient is in a state of renal failure there are considerations other than those of immediate survival and possible sequelæ. The fact that various complications beset such patients and that their renal failure may last for a considerable period shows that, although the prognosis is bad, there may be a time of modified usefulness before them. This part of the picture is made clear in the full title of a paper by C. L. Joiner and M. G. Thorne, which reads: "On the occurrence of skeletal disorders in cases of long standing renal failure."[1]

This article traverses briefly the history of the elucidation of those cases of persons with renal disease, of small stature and with skeletal changes, recognized towards the end of last century and usually identified as rickets. Later the name of "renal dwarfism" was applied, and series were collected. In 1932 Kempson Maddox made a contribution on the subject in THE MEDICAL JOURNAL OF AUSTRALIA, and collected details of 84 cases. Joiner and Thorne now present details of four new cases, of which the principal interest is in the fact that one patient is an adult. They use the comprehensive and concise title of renal osteodystrophy, with the understanding that the renal failure is one involving the whole nephron.

The ages of their patients were 19, 33, 13 and 20 years at the time of first observation; the last of these was the only survivor of the series. The patient aged thirteen years was admitted to hospital for the investigation of infantilism. The man aged twenty years had been in Guy's Hospital at the age of eight, when it was noted that he was failing to grow. Impaired renal function was noted at that time, and his condition was regarded as renal dwarfism. These two patients are regarded as exemplifying juvenile renal osteodystrophy. A point of considerable interest in the man of twenty was that between the ages of fifteen and twenty years during a remission of the renal state he grew rapidly, and added nearly fourteen inches to his stature. When he was examined at the age of fifteen no further deterioration of renal function was found over that degree observed six years previously. The patient aged thirty-three years presented the picture of the adult

[1] *Guy's Hosp. Rep.*, Volume CII, Number 1, 1953.

condition, and the first patient was regarded as of intermediate type. This last-mentioned patient, a woman, was finally admitted to hospital for deterioration of her general condition, and died at the age of thirty years. A series of good photographs illustrates the osteoporosis and metastatic calcified lesions round the joints, the calcification of blood vessels, especially notable in the renal vessels, a remarkable thickening of the skull, resembling that of Paget's disease, and the enlargement of the parathyroid glands.

The authors point out that, although the case histories vary, the chief features are the same, and all belong to the form of skeletal disorder resulting from prolonged renal failure. The signs of renal failure are prominent. The authors recall that in his article Maddox recorded that 40 out of 72 patients showed the signs of polyuria and polydipsia, and drew attention to the error sometimes made in regarding such patients as diabetics. Other striking presenting symptoms are anæmia refractory to iron and pigmentation of the skin, which is not rare, although the muddy complexion of renal failure may more often be seen. Joiner and Thorne point out that their patients resemble those in other and larger series in the comparative rarity of hypertension. They did not observe tetany, and remark that this is not common because of the existence of acidosis, though one of their patients suffered from muscular cramps. The authors discuss the part played by the parathyroids in causing the bony lesions, but the question is not settled. They gave alkalis, and some benefit appeared to follow in their last patient, but not in the others. The bony changes are also discussed in the light of the pathology. The metastatic calcification is worth another mention; it is of interest to both the biochemist and the clinician. Finally the question of diagnosis arises. When stunted growth is a presenting sign there can be little doubt; when the patient is tall and of adult age error is perhaps more likely to occur. Finally, there is the problem of prognosis. Joiner and Thorne note that in three cases they found a low serum sodium level, which may be related to the absence of hypertension, and possibly to a relative longevity, even with the development of osteodystrophy. The effect of a renal remission has been pointed out already.

This condition is rare, but its study sheds light on some problems of renal disease.

PLASMA SUBSTITUTES.

DURING the first World War the difficulties associated with blood transfusion on a large scale led to the search for suitable substitutes. Solutions of gum arabic and of gelatin were used, but were found to be not entirely satisfactory. Search has continued for better solutions stimulated by the expense and potential shortage of stored blood and the danger of virus hepatitis after infusion of plasma. Certain requirements have been considered essential for a desirable substitute for plasma. The viscosity of the material should be such that it is easily infusible in all climates. The substance must not be toxic or antigenic. It must not produce hæmolysis and must be easily sterilizable and free from pyrogens. It must be capable of being manufactured on a large scale and must be storable without alteration. The injected material should eventually be excreted or metabolized and the storage in the body should be brief, but not too brief. It should remain in the blood-stream with levels of not less than 50% of the amount injected at the end of twenty-four hours and should have adequate water-holding capacity. Of the substances tried, most attention has been given during late years to polygelatin, polyvinylpyrrolidone and dextran. These are all polymers and so can exist in various molecular sizes with different properties in the body. Dextran offers many advantages over the others and at least two commercial preparations are on the market. Dextran is a polysaccharide formed during the growth of an organism, allied to streptococcus, *Leuconostoc mesenteroides*, in a sucrose solution. It is made up of very many glucose units polymerized together, but it differs from glycogen in that the glucose remainders are united by 1-6 linkages. As obtained from the culture medium, it has a very high molecular weight—about 40 million. For use as a plasma substitute it is reduced in size by partial hydrolysis and fractionation to particles of mean molecular weight of about 70,000, but the particles in the solutions which have been used vary from very much smaller to very much larger than 70,000. For use it is made up in 6% concentration in isotonic saline solution.

In an attempt to improve the properties of the solution for intravenous injection A. M. Boyd, F. Fletcher and A. Hall Ratcliffe, of Manchester University, have studied methods for the preparation of solutions of dextran of a more homogeneous nature having most of the particles about what was found to be the ideal size.[1] They found that from a physiological point of view the molecules could be divided arbitrarily into four ranges. The highest range consists of those molecules which are so large that they may produce undesirable reactions such as anaphylaxis. This was taken as anything above 250,000. The lowest range consists of those molecules which pass through the glomeruli and are excreted. This is anything below 60,000. Above this is the range of molecules which are too large to be excreted but small enough to diffuse through the capillary wall and thus be lost from the circulation. These molecules are undesirable because, apart from any effect on the intracellular-extracellular fluid balance, they have a certain water-holding capacity, and thus associated water is lost from the circulation. This range is between 60,000 and 130,000. The next highest range contains those molecules which are too large to diffuse through the capillary wall but not large enough to produce reactions. The ideal solution then will contain most of its particles of dextran in the range 130,000 to 250,000. The standard dextran solution had a preponderance of small molecules, the excretion rate was high—35% in twenty-four hours—the blood level at the end of twenty-four hours was low, being 20% of the amount infused. Four other preparations were made with varying distribution of molecular size. The best results were obtained with what the authors call fraction C in which most of the dextran particles were in the molecular range 130,000 to 250,000. With this the highest blood level was obtained, 68%, at twenty-four hours, and also, at 8%, the lowest excretion rate. This material can be used as an infusion for patients undergoing major surgical operations during the operation, and it will rarely be necessary to give any after the operation as the blood level keeps up for forty-eight hours. In shock, after the typing of the blood, the dextran solution is run in quickly, and when there seems to be sufficient it is followed by a bottle of whole blood. The authors suggest that instead of plasma substitutes these solutions be called "blood volume restorers".

AN ANNOUNCEMENT FOR AUSTRALIAN MEDICAL GRADUATES IN ENGLAND.

A LETTER was received recently from the Medical Secretary of the New South Wales Branch of the British Medical Association stating that members of the Association in England were at a disadvantage in regard to the making of application for appointment to vacant positions in Australia because by the time they received their copies of THE MEDICAL JOURNAL OF AUSTRALIA the closing date in many instances had passed. In order to remedy this state of affairs it has been decided to send a copy of the journal each week by air mail to the Empire Medical Advisory Bureau at B.M.A. House, Tavistock Square, London. The Medical Director, Dr. H. A. Sandiford, has agreed to display this copy in the reception room at the bureau. Australian graduates in England are advised to visit the bureau and to ask for the air mail copy of the journal. It should be available to them on the Tuesday or Wednesday after the date of publication.

[1] *Lancet*, January 10, 1953.

Abstracts from Medical Literature.

PHYSICAL THERAPY.

Synergistic Action of Cortisone and Total Body Irradiation.

J. H. WENTWORTH AND J. A. BILLOWS (*Radiology*, October, 1952) state that part of the biological action of ionizing radiation is due to inhibition of sulphydryl obligate intracellular enzyme systems by oxidation of the sulphydryl radical, for example, cysteine to cystine. The protective action against lethal total body irradiation offered by sulphydryl donors such as cysteine and glutathione is further evidence of this mechanism. Also substances which temporarily inhibit oxidation of sulphydryl provide significant protection against lethal irradiation. Cyanide, azide, malononitrile and anoxic anoxia are examples. Cortisone and ACTH have recently been shown to inhibit the sulphydryl obligate systems as part of their fundamental biological action, and therefore some synergistic action of these drugs and total body irradiation could be expected. Three groups of mice were studied. The first group received a single dose of 400*r* total body irradiation, the second group two injections of three milligrammes of cortisone and the third group both. There were 100% survivals in the groups in which irradiation or cortisone alone was given, 31% in the group in which both were given. An experiment to reverse the lethal synergistic effect of cortisone and irradiation by injections of cysteine or glutathione proved unsuccessful. This is regarded as puzzling and may be due to unrelated toxic effects of parenteral administration. Further experiments are to be tried with controlled oral administration of these substances.

Vitreous Hæmorrhage and Hæmorrhagic Glaucoma.

C. E. HUFFORD, F. C. CURTZWILER AND J. L. ROBERTS (*Radiology*, August, 1952) report a series of 74 cases of vitreous hæmorrhage in which treatment was by X-ray irradiation. The series included four cases of hæmorrhagic glaucoma. The authors list the following causes of viterous hæmorrhage: trauma (a wound involving the ciliary body may produce an intraocular hæmorrhage), diseases of the choroid and retina, myopia, glaucoma, hypertension, systemic diseases (diabetes, tuberculosis), atheroma, recurrent hæmorrhages in young persons, chiefly males (Eales's disease), tumours. The technique of treatment is to give 75*r* to 100*r* weekly for four weeks, through a 2·5 centimetre cone (factors are 200 kilovolts and a Thoraeus filter). This course may be repeated after six weeks. The authors consider that improvement occurred in 65% of patients, 22% were unimproved, and 13% were untraced. They reach the following conclusions: (i) X-ray therapy for vitreous hæmorrhage is beneficial, hastening the absorption of blood clots and improving visual acuity. (ii) Except in cases of vitreous hæmorrhage due to diabetic retinitis, X-ray therapy decreases the development of complications and sequelæ such as retinal detachment, secondary glaucoma and severe retinosis. (iii) In cases of hæmorrhagic glaucoma, X-ray therapy prevents the need for enucleation and other surgical procedures. (iv) In cases of traumatic hæmorrhage into the vitreous, whether due to injury or following operative procedures, X-ray therapy is a very efficacious method of treatment, both in absorbing the blood clot and in preventing sequelæ. (v) In cases of diabetic retinosis little effect can be expected on the vascular component of the retina; however, absorption of the recurring hæmorrhages will be hastened.

Malignant Serous Effusions and Radioactive Colloidal Gold.

R. J. WALTON (*J. Fac. Radiol.*, October, 1952) states that among the distressing late complications of malignant disease is the formation of fluid in the serous cavities. Such effusions are often found between the layers of pleura in association with carcinoma of the breast and in the peritoneal space in association with carcinoma of the ovary. The administration of radioactive colloidal gold has proved to be of benefit in these cases. In the present series all patients with malignant effusions were at first accepted for treatment, but later patients in poor general condition were rejected, as they seemed to deteriorate rapidly after treatment. The patient is admitted to the hospital for five to seven days. In the operating theatre paracentesis is performed and as much of the effusion as possible is removed, care being taken that no air is admitted to the cavity. Then 50 mils of saline are run in, followed by the colloidal gold solution and then a further 50 mils of saline, a total of about 200 mils of fluid. It has been calculated that, if the fluid is evenly distributed, the dosage to the serous membrane is between 4000*r* and 7000*r*, most of which is from β radiation. In this series 18 patients with pleural effusion and 16 with ascites were treated. Considerable benefit was obtained in seven cases of pleural effusion and in five cases of ascites. The author considers that the method is well worth a trial as a palliative measure.

Vascular Anomalies of the Central Nervous System.

G. KAPLAN, B. BOSWIT AND E. G. KRUEGER (*Radiology*, October, 1952) state that the vascular lesions under consideration are regarded as congenital malformations and are divided into three types: (*a*) telangiectases, (*b*) venous angiomata, (*c*) arterial or arterio-venous angiomata. Symptoms which may occur are headaches, vomiting, vertigo, epilepsy and hemiplegia. The vast majority of these lesions cannot be completely extirpated by surgery, and in most instances surgical decompression only is possible. Post-operative irradiation has been employed in an attempt to produce endarteritis. The present study is of nine cases, five with cerebral localization and four in the spinal cord. In seven cases decompression only was performed, in one case ligation of the common carotid was carried out, and in one case decompression was performed followed later by ligation of the common carotid. Deep X-ray therapy was given post-operatively in every case. The depth dose varied from 700*r* to 2400*r* and the overall treatment time from six to twenty-eight days. In no case did X-ray therapy produce further improvement following surgery, or produce improvement if surgery had failed. It is felt that the results of irradiation of vascular malformations depend upon the size of the vessels involved. If the vessels are of capillary or arteriolar type, good results can be expected with doses of the order of 1200*r*. If the vessels are of larger calibre, there will be no satisfactory response even with larger doses. Unfortunately the predominant type of vascular formation is of fairly large vessel calibre.

Cancer of the Breast.

DONALD E. ROSS (*Am. J. Surg.*, September, 1952) gives an historical account of the treatment of carcinoma of the breast. He states also that in America now less reliance is being placed on irradiation. It is considered that pre-operative X-ray therapy is of little value in the "operable" case and may cause harm through delay. On the other hand, it is possible in the advanced cases that pre-operative irradiation has not been given sufficient trial and that some of these cases can be made operable by such treatment. There is now a feeling that post-operative X-ray therapy is useless and may do harm. Most authorities place their principal reliance on wide and thorough radical surgery. It is usual to precede radical surgery with biopsy; for this the wide excision method with the diathermy knife is preferred. If the biopsy result is positive, radical operation is then performed.

RADIOLOGY.

Hæmophiliac Arthropathy of the Hip.

M. E. WINSTON (*J. Bone & Joint Surg.*, August, 1952) states that it is well known that the recurrent hæmorrhages which occur into the knees of some hæmophiliacs may produce permanent changes in those joints. It is well known that the hips can be affected and that rather characteristic changes can occur in the epiphyses of the femoral heads. The author presents some details of seven hæmophiliacs whose hips were affected in this way, and draws attention to the importance of the intraosseous changes and to their possible significance in the pathology of the hip. He states that in hæmophiliac arthropathy, the joint becomes distended with blood under pressure. The blood acts as an irritant, and hyperplasia of the synovial membrane occurs. Pigment and, later, connective tissue are laid down in the subsynovial tissues. At the same time, cartilage is eroded at the margins of the joint, and the central articular cartilage undergoes a variable amount of destruction. The characteristic change in the bone is the appearance of cavities, which may be deep in the cancellous bone, or shallow depressions in the bone underlying the articular cartilage. The bone cavitation is considered to be due to intraosseous hæmorrhage. The characteristic result produces a radiographic appearance

rather resembling that of pseudo-coxalgia (Legg-Perthes's disease), a condition which, apart from hæmophilia, usually appears to be due to any of several causes of a vascular disturbance leading to degenerative changes in the growing head of the femur. The present series suggests not only that there is a difference between hip joints affected before and after puberty, but that the changes in the hip joint differ in the different age groups. It is evident that hæmorrhage can occur into any part of the joint. It may occur into the joint cavity or into the bone, or may involve all parts of the joint. The changes which result depend not only on the age of the patient but also on the site and severity of the hæmorrhage. There may also be a variation in the degree to which different structures are vulnerable, in addition to an individual susceptibility. The epiphysis and epiphyseal cartilage are most susceptible to the effect of hæmorrhage and early damage will produce more severe deformity later. Intraosseous hæmorrhages are of primary importance in producing the changes seen in bone and cartilage. Intraepiphyseal hæmorrhage is responsible for most of the epiphyseal damage, though it takes weight-bearing to complete the collapse of the epiphysis and to produce severe deformity. With continued weight-bearing the epiphyseal deformity increases. In patients affected after puberty the effects are not so severe. Hæmorrhage into the head produces cyst formation without collapse, and intraarticular bleeding may produce no more than irregularity of the articular cartilage with narrowing of the joint space, changes which resemble those of any arthritic joint. If deformity of the head is present, it is likely that there was earlier epiphyseal damage, and it seems unlikely that epiphyseal damage of any severity could occur without later deformity.

Intraabdominal Hernia.

A. JUSTIN WILLIAMS (*Radiology*, December, 1952) states that the possibility of radiological diagnosis of internal hernia has been neglected by many radiologists when making routine gastro-intestinal examinations. Clinicians, also, have been remiss in recognizing the associated clinical syndrome and have not referred cases to the radiologist for small bowel studies with this condition in mind. As a result, many internal herniæ are overlooked. There are numerous positive radiological signs of hernia and similar conditions which, when searched for and recognized, will lead to the diagnosis with a reasonable degree of accuracy. Internal herniæ and torsion of loops of small intestine about congenital bands or adhesions, which may produce a similar clinical and radiological picture, can be diagnosed but not always differentiated by X-ray examination. The primary radiological sign of these conditions is displacement or disturbance of small bowel arrangement. Secondary findings are segmental dilatation, stasis, antiperistalsis and fixation. Sacculation or clumping, when found, is important, but it does not always occur, and when present does not offer a means of differentiation between hernia and torsion. Studies of the small bowel are necessary to demonstrate these conditions and must be made with the patient in horizontal and erect positions. Lateral erect studies are the most accurate and informative of all, and should be carried out in all cases in which hernia or torsion is suspected. Repeated studies may be necessary and are best made during an attack, as a hernia or torsion may be completely reduced during a remission. When the diagnosis has been made, the surgeon must be aware of the possibility of spontaneous reduction of the hernia or torsion before or at the time of operation and make a careful search for abnormal fossæ, mesenteric defects or adhesive bands, if herniation or torsion is not found.

Peptic Ulcer of the Second Part of the Duodenum.

ELLA PREISKEL (*Brit. J. Radiol.*, December, 1952) states that approximately 12% of duodenal ulcers are situated in the second part of the duodenum. Radiologically the main features are (i) narrowing of the duodenum in the vicinity of the ulcer and (ii) the presence of an ulcer crater. The narrowing of the duodenum may be due to spasm, œdema or fibrosis; it is constant and independent of the phase of passage of the peristaltic wave through the duodenal loop. A crater will be recognized if it is comparatively large. A small crater will be lost amongst the complex barium-coated folds produced by the *valvulæ conniventes*. For this reason the only evidence of ulceration may be the narrowed duodenal lumen. The narrowing does not involve the entire descending limb, but is limited to one or two centimetres on each side of the ulcer and is seen in the majority of cases in the upper half of the descending limb. The transition to a completely normal width and normal mucosal pattern appears in most cases to be abrupt, and the contrast between the narrowed segment and the normal duodenum is easily seen distal to the lesion. This sharp demarcation of the narrowed segment and its position aid in the differential diagnosis of benign ulceration from other conditions affecting the duodenal loop. Narrowing of the duodenal lumen may be caused by carcinoma of the duodenum, carcinoma of the head of the pancreas, pancreatic cyst or annular head of the pancreas. In carcinoma of the duodenum and also in the late stages of invasion by carcinoma of the pancreas, distortion and dissolution of the mucosal pattern may occur. There is not the sharp demarcation from normal on each side of the lesion that is seen with benign ulcer. With carcinoma of the head of the pancreas and with pancreatic cyst, the duodenal loop may be splayed out. An annular head of the pancreas surrounding the duodenum may show sharp demarcation of the narrowing and is usually associated with duodenal stasis. Cases in which a small ulcer crater is seen must be distinguished from those with contrast filling of the ampulla of Vater. The position of this pseudo-crater is anatomical, and the duodenum itself is normal. When a large crater is present, differentiation has most frequently to be made between a true ulcer crater and a primary diverticulum of the duodenum. Diverticula most frequently spring from the medial concave border of the duodenum in the region of the ampulla of Vater, although they may originate anywhere distal to the superior genu. They may be multiple, and their necks can frequently be seen. No alteration in the width of the duodenal loop itself ever occurs in an uncomplicated case.

Volvulus of the Caecum.

HERBERT L. ABRAMS AND WARREN A. WASS (*Radiology*, January, 1953) state that volvulus of the caecum is an acute abdominal emergency in which a twist at or above the caecum produces luminal occlusion. As a prerequisite for its occurrence, there must be excessive mobility of the caecum. The radiological examination is diagnostic. On plain films, a massive gas-filled loop of bowel is seen in one of the quadrants of the abdomen, or in the mid-abdomen or pelvis. The axis of this bowel loop is such that it usually points in the direction of the right lower quadrant, no matter in which portion of the abdomen it is. This may aid in differentiation from sigmoid volvulus, in which the axis of the distended loop usually points in the direction of the left lower quadrant or pelvis. In cases of sigmoid volvulus, the two sides of the closed loop of sigmoid colon frequently can be seen rising in an almost vertical direction from the pelvis. A further differential point is that with volvulus of the caecum no gas is seen in the transverse or descending parts of the colon, whereas these portions of the colon are distended in sigmoid volvulus. The distended caecal loop may extend into the left upper quadrant and simulate the appearance of the stomach. With a tube in the stomach attached to a suction apparatus, the failure of the loop to be deflated immediately demonstrates that it is not stomach. Similarly, a small amount of barium may be run through the tube into the stomach, delineating its contours. Slight to marked small-bowel distension is present. If the plain film findings are inadequate for diagnosis, the instillation of barium in the colon will show collapsed but patent descending and transverse portions of the colon, and the barium column will suddenly be obstructed at some point in the ascending portion of the colon. This point is always adjacent to the large gas-filled loop.

Tuberculosis of the Hip Joint in Children.

FRANKLYN G. WOOD AND M. C. WILKINSON (*Brit. J. Radiol.*, August, 1952) state that with further experience of tomography, more reliance is being placed on tomographs of the hip, not only for the information afforded concerning areas of bone lysis or of ischæmic necrosis, but also because the joint appears beautifully outlined at various depths without being obscured by superimposed shadows. Information can thus be obtained about the degree of integrity of the joint, and whether there have been changes in its structure or its neighbourhood which would make the success of streptomycin treatment problematical, at any rate so far as the possibility of restoring function to the joint is concerned.

Special Articles for the Clinician.

(CONTRIBUTED BY REQUEST.)

LXV.

HIATUS HERNIA AND ŒSOPHAGEAL REFLUX.

THE clinical clarification of the common conditions of hiatus hernia and œsophageal reflux and their complications is one of the major contributions of the development of thoracic surgery in the last two decades. It is comparable with that concerning duodenal and gastric ulcer in the decades preceding. Indeed, the two subjects have a great deal in common—not the least being a number of unsolved problems. Allison, of Leeds, played a leading part in the later story, as Moynihan did in the earlier. By "thoracic surgery" I mean, of course, the achievements of the team—physician, surgeon, endoscopist, radiologist, pathologist and anæsthetist.

Our subject is a double-headed one, but one, like the Paps of Jura, with considerable common basic ground. Hiatus hernia is a hernia, almost always of the cardia and upper part of the stomach, through a relaxed œsophageal opening in the diaphragm. It is a clinical entity on its own, with appropriate treatment. One of its common results—but only one of several—is a failure of the usual mechanism whereby gastric contents are checked from regurgitation into the lower part of the œsophagus. This reflux can become a very serious matter. It occurs in patients in whom no hernia can be demonstrated radiologically, but the majority of patients with symptoms or sequels of acid regurgitation have a hernia, and therefore a tangible and also a tractable cause for what are often their chief troubles.

Hiatus Hernia.

Hiatus hernia is easily the commonest type of, and in the commonest situation for, diaphragmatic hernia. A few congenital types occur in recognized situations on both sides, and the traumatic rupture, often from crushing accidents, sometimes delayed in manifestation, and commonly splitting the dome of the central tendon on the left (occasionally on the right) side, is a distinct entity with characteristic presentation.

Hernia through the œsophageal hiatus is occasionally congenital, or at least discovered in childhood, and the underlying lesion may be a shortening of the œsophagus. The effects of this are similar to those of the acquired hernia, and may be considered along with the latter variety, the chief differences being the presentation in childhood, and the often serious and pitiful course taken by the disease.

The great majority of hiatus hernias are acquired, and are discovered in adult life, from the fourth decade onwards, the maximum incidence being perhaps the sixth decade in cases in which symptoms are troublesome and operation comes to be considered. Many cases, of course, go unsuspected and unrecognized for years. Others are recognized for one reason or another, but cause serious discomfort only in the fifth, sixth or seventh decade. An occasional octogenarian is found with a symptomless hernia; another—at least one—octogenarian has not only turned up with a very uncomfortable hernia but insisted on its repair—with complete satisfaction to all concerned.

Women predominate in most series, perhaps because they are more exposed to the fundamental predisposing cause—passing or continuous increase in intraabdominal pressure. Repeated pregnancies, adiposity, ascites, abdominal tumours and accidents involving abdominal pressure, such as being doubled over a steering wheel and bomb blast, are common factors. The hernia may disappear when the strain is off (for example, the baby is born), but it may reappear perhaps many years later with advancing years, impoverished muscle tone and increasing weight, and then cause trouble.

Anatomically a portion of the stomach passes up intermittently into the chest. Frequently this portion is only one inch long, an average size is two to three inches; but one-third, one-half, or even the whole of the stomach, *plus* perhaps other organs such as spleen, omentum, bowel and so on, may lie habitually or periodically in the chest. Even the smaller hernias exhibit a sliding pouch of peritoneum over the front and sides of the stomach. The fascial sheaths of the organs are stretched, and the gap between the two slips of the right crus commonly admits two, three or more fingers alongside the gut. In the large hernias, a whole hand will pass through the hiatus.

The hernia tends to fill, or to increase in size, when exercise, a full meal or recumbency alters the relative pressures so as to encourage the upward transit.

Clinical Presentation of Hiatus Hernia.

Three types of clinical presentation of hiatus hernia occur in the following order of increasing frequency and importance. The types, however, are often confused, one patient presenting a combination of two of the types, or features taken from two or more of all the types.

1. Dysphagic symptoms, referred pretty accurately to the level of the lower end of the sternum, and caused by solids rather than liquids. The dysphagia may be transient and slight, or quite serious in degree simulating carcinoma. The latter situation obtains chiefly when œsophagitis and actual ulceration have led to organic stricture.

2. Heartburn, acidity and acid risings in the œsophagus. Here the patient may be of the peptic ulcer type, and not infrequently a duodenal ulcer is present as well. The psychological characteristics so well known in duodenal ulcer patients may be present here also. These symptoms are due to the loss of the normal somewhat complex and incompletely understood mechanism for guarding the cardia against reflux. It can well be understood that a cardia rising high in the thorax, with altered angle of entry of the gullet into the stomach, and loss of the pinch-cock action of the hiatus itself, will favour reflux. Stooping forward, exercise and recumbency will favour this reflux, which at times reaches such frequency and seriousness that the patient's life is a misery. We all know the harsh feel of acid contents in the lower part of the gullet—at the moment of vomiting—but this felt habitually, sometimes up to the pharynx, is very distressing.

3. Pain. This is the commonest but also the least clearly defined symptom found with hiatus hernia. It is presumably due to such factors as stretching the hiatus and membranes near by, to gaseous or other distension of the "bubble" or segment of stomach above the diaphragm, and to reflex disturbances of heart and other organs through vagus and phrenic irritation. There is also the pain set up by peptic ulceration of the lower part of the œsophagus and the resulting induration and adhesion to adjacent tissues. Pain is often felt deep in beneath the xiphisternum, or high in the epigastrium, and through to the back. It may be referred to the hypochondrium, left more often than right, and to the shoulder, but rarely lower than the rib margin. Exercise, taking food and recumbency again tend to make the pain worse. Commonly the patient is awakened at night by the pain, and learns to relieve it by sitting up or getting out of bed and walking a little, and to anticipate it by sleeping propped up on two to four pillows. The pain may be severe or slight. Should incarceration of the contents of the hernia take place, pain is severe and calls for urgent relief.

Differential Diagnosis.

These protean manifestations suggest considerable difficulty in being sure a hernia is present, or if it is, in knowing exactly how much of the complaint is due to it. The only safe plan, and one fully justified by the great frequency of hiatus hernia, is to bear the condition in mind in all cases of upper abdominal and lower thoracic disorders, and have the hiatus looked at on all occasions of X-ray investigation for upper abdominal complaints. Many patients with hiatus hernia also have gallstones, duodenal ulcer and heart conditions. It is quite a common experience to find a patient with a hernia confess to a previous cholecystectomy without relief, and without stones to show for it.

Between duodenal ulcer and calculous cholecystitis on the one hand, and hiatus hernia on the other, a careful history elucidating the symptoms given above and the degree of relief obtained by adhering to conditions calculated to diminish or abolish the hernia (sleeping sitting, avoidance of effort *et cetera*) will often lead to a sound judgement.

In the diagnosis between coronary or other heart pain and hiatus hernia, again the careful history is perhaps the greatest single help. Attention to the symptoms while the patient is at rest and cardiological findings also help.

The final therapeutic test of mending the hernia and revaluation of the symptoms afterwards is sometimes the only way to be sure, in a given case, about the apportionment of blame.

Associated Conditions and Sequels of Hiatus Hernia and Acid Reflux.

A great variety of associated conditions is found in any large series. Gallstones and duodenal ulcer have been

mentioned as common. Carcinoma of the œsophagus, cardia, upper end of the stomach and pylorus have all been found associated—perhaps accidentally—with hiatus hernia. One patient presented with trouble from a hiatus hernia a short while after operation to cure a long-standing major rectal prolapse. Gastric ulcer has been found opposite the hiatus, as though the edge thereof was digging in.

The most serious sequels concern acid reflux, whether that is due to the hernia, or whether it occurs on its own as described by Lawler and McCreath (1951). The acid juices set up œsophagitis seen by the endoscopist as a velvety redness, very prone to bleed on touching, usually in the lower two or three inches of the gullet. Actual ulceration may follow, leading to a genuine peptic ulcer, deeply punched out, with surrounding infiltration and adhesion to adjacent tissues, scarring and obstruction. Hæmorrhage, in the form of microscopic repeated bleeding capable of leading to severe anæmia or gross hæmatemesis or melæna, must always be kept in mind, and the appropriate blood examinations carried out.

Special Examinations.

Fluoroscopy is the readiest and most useful confirmatory step. Special care must be taken to use the Trendelenburg position and abdominal pressure, and both herniation and reflux are to be looked for. In addition evidence of ulcer or stricture may be seen. The examination should always include at least stomach and duodenum as well, lest a malignant condition or other associated lesion be missed. Hiatus hernia is notoriously elusive, even when the examination is in experienced hands. It may not be demonstrated at the first or even the second examination, or even, in an established case, on a second occasion. A number of patients exhibiting reflux but no hernia prove to have a hernia at operation.

Œsophagoscopy has been mentioned. It is not always an essential, and it sometimes upsets the patient; but evidence of œsophagitis is useful to have and supports the need for checking reflux.

Treatment.

Medical measures including antacid treatment in its various forms, alteration of mode of life as found possible when acidity is prominent in the picture, and resting and sleeping half propped up are all helpful. Each patient can discover the most harmful circumstances and plan to avoid them; for example, one patient cannot tolerate sitting forward over a card table after a big meal, but will do better with a mid-day dinner and a light evening meal.

Surgical treatment comes up for consideration under a variety of circumstances. A number of patients known to have a hernia—even a sizeable one—are quite symptomless, and should be left alone. Others will get adequate relief with medical treatment, but these should be kept under observation for anæmia and œsophagitis. Those whose chief trouble is pain must be judged on their merits. All possible measures are taken to apportion the responsibility for symptoms between hernia and associated lesions, and if the hernia is chiefly to blame, the decision may be largely left to the patient. He may be told that operation will cure him, and that it may be performed if and when he asks for it.

Patients with acid reflux, either obvious or shown by œsophagoscopy, should, generally speaking, be operated on. The insidious development of œsophagitis, anæmia, ulceration and stricture, and calamitous hæmorrhage is always "in the offing", and cure before serious complications set in is a sound aim.

Operative Treatment.

An hiatus hernia may be easily and reliably cured by a simple operation whose only difficulty is the deep situation of the trouble. Both the abdominal route of approach, with the use of relaxant drugs and the freeing and retraction of the left lobe of the liver, and the thoracic route are satisfactory. My own preference is for the thoracic route, a relatively short incision being made through the bed of the ninth or tenth rib, or in the ninth or tenth intercostal space. The diaphragm is depressed and the lung retracted. The fatty extraperitoneal fat over the stomach is soon seen one to four or more inches high. The gullet is encircled with a tape. The muscular edges of the hiatus are cleared. The peritoneal pouch is tucked down under the diaphragm with a series of vertically disposed silk sutures. The crural slips are united with stronger silk laterally until the first joint of the finger only will enter the hiatus alongside the gullet. The pleura is united and air sucked out, and often no drain is required. Early ambulation is the rule, and the patient may leave hospital in eight to twelve days.

Post-operative complications and difficulties are not great. Sometimes temporary dysphagia occurs owing to too tight a closure. Effusions and intercostal nerve pains are sometimes met with. Recurrence of the hernia must be admitted in a proportion of cases—as in all hernia operations—but may usually be cured if necessary by a second operation.

Cases complicated by ulcer and stricture are difficult to deal with; hence the anxiety to avoid complications by early correction of reflux. Dilatations and replacement of the ulcerated œsophagus below the diaphragm have a place. Resection with anastomosis of the gullet to the stomach carries a risk of further reflux and ulceration; whereas if the jejenum is used, the operation is a big one, whether the stomach is excised or merely excluded.

Summary.

Diaphragmatic hernia through the œsophageal hiatus, much the commonest type, and so common a lesion that it is said to rank second only to duodenal ulcer amongst the positive findings in all patients submitted to radiological examination for upper abdominal complaints, is described in its anatomical and clinical features.

One of its commonest sequels—acid reflux into the gullet, leading to œsophagitis, peptic ulcer of the gullet and stricture—is very similar in nature to duodenal ulcer, which results from the too frequent and prolonged action of acid gastric contents in a part of the alimentary tract equally unfitted to withstand it. Gastric juice is evidently sanitary only between the cardia and the pylorus.

A plea is made for alertness to hiatus hernia, and for clinical interest in the elucidation of its responsibility, when it is found, for symptoms and illness.

The surgical correction of hiatus hernia is described and commended as a simple and on the whole a reliable method of curing symptoms due to the hernia, and of anticipating or relieving the troubles arising out of acid reflux. Only in the later stages of ulceration, severe bleeding and stricture are major measures called for. Many patients are very grateful for the cure of an hiatus hernia.

Reference.

LAWLER, N. A., and MCCREATH, N. D. (1951), "Gastro-Œsophageal Regurgitation", *Lancet*, 2: 369.

DOUGLAS ROBB,
Auckland.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on December 5, 1952, at the Saint George Hospital, Kogarah, New South Wales. The meeting took the form of a series of clinical demonstrations by members of the medical and surgical staffs of the hospital. Parts of this report appeared in the issues of May 16 and May 30, 1953.

Colectomy for Chronic Ulcerative Colitis.

DR. T. E. WILSON showed a man, aged fifty-three years, who had been admitted to the Saint George Hospital on July 30, 1952, with a history of constipation for many years and of attacks of abdominal pains for fourteen years. For the previous month he had been complaining of the passage of blood and pus *per rectum*, of diarrhœa and of increased abdominal pains. During that month he had lost 10 pounds in weight. His general condition had remained fairly good. The sigmoid colon was palpable and slightly tender. Sigmoidoscopy revealed extremely numerous pseudopolypi and polypi to a distance of 25 centimetres with ulceration of the mucosa between the polypoid masses. A biopsy of one of the latter did not show any evidence of malignancy. The hæmoglobin value was 10·9 grammes *per centum*, the red blood cells numbered 4,900,000 per cubic millimetre, and the leucocytes numbered 16,600 per cubic millimetre. The serum protein content was 6·0 grammes *per centum*. After transfusion his hæmoglobin value rose to 12·3 grammes *per centum*. In view of the widespread involvement of the mucosa laparotomy was carried out on August 6, 1952. The rectum and the left half of the colon were found to be closely studded with polypoid masses, but no macroscopic evidence of malignant disease was found. A perineo-abdominal excision of the rectum was performed, the dis-

section being carried up to the right side of the transverse colon. The ascending colon and the right half of the transverse colon appeared to be normal. The bowel was divided just distal to the hepatic flexure and the end brought out as a terminal colostomy. Following this operation convalescence was uneventful.

The excised specimen was more than three feet long. Dr. A. E. Gatenby reported that its mucosa was studded throughout by flat polypi which varied in size, the largest being several centimetres in diameter. Between the polypi most of the mucosa was ulcerated. The microscopic appearances confirmed the diagnosis of severe ulcerative colitis; and no evidence of malignant change was found in the tumours or in the lymph glands of the mesentery.

Dr. Wilson said that although it was realized that most patients with chronic ulcerative colitis who required removal of portion of the colon would eventually require a total colectomy, the disease process in the present case appeared at operation to be confined to the left side of the colon. Although examination of the excised specimen showed that the mucosa was affected to a less extent right up to the site of division, the patient might have many years with the colostomy before an ileostomy eventually became essential. Till then the discomfort of the latter was avoided. The removal of all the grossly involved bowel at the one operation was simpler than a two-stage procedure and had much to recommend it. The reduction in the number of stages was in keeping with the recent practice of combining colectomy and ileostomy at the one operation.

Multiple Plastic Procedures.

Dr. Wilson's second patient was a man, who on February 18, 1949, whilst spray painting in a power house, had suffered severe electrical burns and fallen off a ladder. On admission to hospital, his general condition was very poor; he had second and third degree burns of the face, neck, front of the chest, both arms and the right hand, deeper burns of the left hand, burns of both corneæ, and lacerations of the scalp and right arm. Morphine, serum and blood transfusions and penicillin were given, and after *débridement* the burnt areas were dressed with penicillin powder, *tulle gras* and saline packs. When his condition improved the lacerations were sutured. The skin of the left hand had been completely destroyed, and in the palm tendons and metacarpals were exposed. Despite treatment, infection became established in the left hand and resulted in such deterioration in his condition that amputation through the wrist joint became urgently necessary on April 6. The wound was not sutured. At the same time split-skin grafts were applied to both forearms and both cubital fossæ. Most of the grafts to the right arm and the whole of the grafts to the left arm took successfully. On May 25 Dr. Eunice Wilson corrected the patient's right ectropion by excision of the scar and grafting. On July 7 a right perinephric abscess was drained, and pus containing *Staphylococcus aureus* was evacuated. The wound of the left forearm remained unhealed, and on August 24, 1950, amputation was performed two inches above the wrist joint and the wound closed. As pus collected in pockets in the wound, it was necessary to reexplore the right perinephric abscess on September 21, 1949, on October 26, 1949, and August 12, 1950. On December 20, 1949, X-ray examination showed destruction of the adjacent margins of the second and third lumbar vertebræ with obliteration of the intervening joint space. An excretion pyelogram showed no abnormality. On February 1, 1950, a left perinephric abscess was drained, and again *Staphylococcus aureus* was grown from the pus; it was necessary to reopen the wound on November 18, 1950, and June 27, 1951. In May, 1950, the patient developed lobar pneumonia, and that was followed by suppurative prepatellar bursitis, for which incision was necessary on June 6, 1950. On June 24, 1950, a subcutaneous abscess of the right buttock was drained. The last-mentioned two infections rapidly subsided, and on July 27, 1950, a longitudinal scar in the neck, which was holding the chin about two inches from the sternum, was excised and the defect covered with split skin. The graft took successfully except around the edges, but another longitudinal ridge of scar tissue developed, and on January 10, 1951, a "Z"-plasty was carried out. After that the patient regained full movement of his head and jaw, and the angle of his mouth was no longer depressed. On January 24, 1951, reamputation of the left forearm and excision of a painful bulb on the median nerve were performed. Since then the stump of the left arm had been very satisfactory. On February 28, 1951, a scar which was restricting extension of the right elbow was excised and the defect covered with split skin. Although the right forearm had been covered with skin since May, 1949, the flexor tendons had become adherent to the grafts, and thus movement of the fingers was very limited. On April 28, 1951, a tube graft was raised from the abdomen, and on May 23, 1951, the lower end of that was attached to the wrist. After another two weeks the other end was freed from the abdomen and also attached to the wrist. On August 8, 1951, the flexor tendons of the right forearm were freed, and the pedicle graft was spread. The patient was discharged from hospital to his home on November 24, 1951, with all wounds healed except the two perinephric wounds, both of which had continued to discharge a few drops of pus per day. He now had full movements of both elbows, and he had only slight limitation of movements of the fingers of the right hand. Movements of the jaw and head were full, but there was still a palpable ridge of fibrous tissue over the left sternomastoid muscle. Both perinephric wounds occasionally discharged a few drops of pus, but did not cause other symptoms. He was steadily gaining weight, and his general condition was excellent. Whilst in hospital he had received transfusions on 14 occasions, and he had had 16 general anæsthetics for operations and dressings. Nine other operations had been performed under local anæsthesia.

Ureteric Transplantation for Carcinoma of the Rectum.

Dr. Wilson then showed a man, aged sixty-three years, who on August 1, 1951, had undergone perineo-abdominal resection for an adenocarcinoma of the lower end of the rectum which extended into the anal canal. There was no evidence of intraabdominal metastases or of local invasion of extrarectal structures, and the dissection appeared to be well clear of the growth. On October 10 and on November 7 block dissections of the inguinal lymph glands were performed. Dr. Gatenby reported that both sets of excised glands were extensively involved with metastases. As usual, the wounds were slow to heal. During convalescence the patient developed bilateral basal pneumonia and then coronary occlusion. However, he recovered from both of those and was discharged from hospital to his home on December 15 with all wounds healed and the colostomy functioning satisfactorily.

On June 3, 1952, he was readmitted to hospital because of the development of a metastasis deep to the perineal scar. After leaving hospital he had been very well for about three months, but then he began to complain of pain in the perineum, which gradually increased in severity. He was also complaining of slight difficulty in starting micturition. On June 4 an attempt was made to excise the perineal metastasis, but it was found to be infiltrating both sides of the pelvis, bladder and prostate. The greater part of the malignant tissue was removed. When he was discharged from hospital on July 27 the perineal wound was about half an inch long and about half an inch deep and was no longer painful. That wound never quite healed, and the pain gradually returned. When he was seen on September 22 he stated that there had been a urinary discharge from the perineal wound for about four weeks and that he had passed only blood *per urethram* during that time. For two weeks he had experienced severe pain in the penis on attempting to pass urine. In the anterior end of the perineal wound was a urinary fistula about a quarter of an inch in diameter, and that was surrounded by a hard mass about two inches in diameter. His blood urea content was then 36 milligrammes *per centum*. An excretion pyelogram showed that both kidneys were functioning normally and that there was no obstruction of the ureters. The bladder was shown to be somewhat distorted. On October 1, 1952, the right ureter was transplanted into the caecum and the left into the descending colon, the Nesbit open technique being used. During the operation one metastasis was palpated in the liver and the presence of pelvic metastases was confirmed. Before the operation he had been given phthalyl sulphathiazole (three grammes three times a day) and streptomycin (0·5 gramme three times a day) orally for three days. Those were continued for the following five days. During that time he also received "Albucid" (one gramme three times a day), potassium citrate (60 grains three times a day) and intramuscular injections of penicillin (100,000 units six-hourly). For the first twenty-four hours all fluids were given by intravenous infusion. Thereafter he was given copious fluids by mouth. After this operation no rise in temperature occurred, but slight tachycardia persisted for seven days. After twenty-four hours urine was obviously draining from the colostomy. Dr. Wilson said that the patient had been using a colostomy bag with an inflatable cuff, which was controlling the wet colostomy drainage fairly well. On November 7 his blood urea content was 44 milligrammes *per centum*. On November 6 and on November 14 excretion pyelograms showed that both kidneys were

functioning normally and that there was only very little dilatation of the ureters.

Vesico-Colic Fistula.

Next Dr. Wilson showed a man, who was born in 1913, and who had been first admitted to the Saint George Hospital on September 8, 1950, complaining of an attack of lower abdominal pain on July 26 and of persistent pain since September 6. On the day of admission to hospital he had vomited several times. At that stage there had been no dysuria. In the previous year an appendicectomy had been performed for acute appendicitis. Apart from slight tenderness in the hypogastrium and on rectal examination, no abnormality was found and he was discharged from hospital on September 13, 1950. On September 4, 1951, he was readmitted to hospital complaining of pneumaturia and the passage of offensive urine for two months, and of constipation and intermittent lower abdominal pains for nine months. There was some tenderness in the lower part of the abdomen, and on rectal examination a firm, tender mass was palpable above the prostate. Cystoscopy showed the presence of cystitis, but the orifice of the fistula was not seen. On September 5 a transverse colostomy was performed. At that time the pelvis was found to contain many inflammatory adhesions, which matted the bowel together. The sigmoid colon contained many inflamed diverticula. After eighteen days he was discharged from hospital to his home. Two months later he developed acute orchitis, which subsided after a week of penicillin therapy. Apart from a dislike for the colostomy, he was then free of symptoms and continued to improve. At laparotomy on March 19, 1952, many of the pelvic adhesions were found to have vanished. The recto-sigmoid region which contained the fistula was excised, and the continuity of the bowel was restored by end-to-end anastomosis. The opening into the bladder was healed. Convalescence after that operation was uneventful. An enterotome was applied to the colostomy spur on April 25, and on June 18 the colostomy was closed by the "extra-peritoneal method". Since then there had been no symptoms, and his general condition had steadily improved.

Œsophagectomy for Caustic Stricture.

In conjunction with DR. FRANK ELLIS, Dr. Wilson showed a child, who had been admitted to hospital on December 11, 1951, at the age of two years and ten months, with a history of having swallowed a mouthful of concentrated solution of pure sodium hydroxide. Immediate treatment by having the child swallow some vinegar was given by the parents. On admission to hospital the child was in fairly good general condition except for burns about the lips and gums, and he was salivating freely and afraid to swallow. Some weak acetic acid was given, and he settled down. The next day he was able to swallow fluids. Over the next three weeks he was fairly well except for intermittent fever and some melæna. He could take fluids and semisolids well, but would often vomit after swallowing, particularly with solids. The tendency to vomit and regurgitate became worse, and after a consultation with Dr. Ellis the patient was transferred to the ear, nose and throat service for œsophagoscopy and barium swallow examinations. Œsophagoscopy revealed a tight stricture at a distance of 20 inches from the incisor teeth. Dilatations were commenced under direct vision with a set of Jackson dilators (comprising sizes number 10 F. to 40 F.). It was found difficult at first to dilate beyond size number 14 F. A barium swallow examination confirmed the œsophagoscopic findings and showed a well-marked constriction commencing at the level of the sixth thoracic vertebra and extending downwards for an inch or so. Regular dilatations were commenced first at weekly intervals and later fortnightly, and they were carried out over a period of six months. On each occasion the stenosis was found to have tightly recurred, and it was always difficult to dilate the strictured area beyond a number 18 F. dilator. However, after each dilatation he was able to swallow sieved foods and semisolids for a while.

On May 25, 1952 (about six months after the initial accident), he was brought to hospital because he was vomiting and regurgitating everything. Œsophagoscopy revealed complete obstruction at the stenosis; it was impossible to pass even the finest dilator. The position was reviewed and it was decided to attempt a one-stage œsophagectomy. If that failed a gastrostomy would be made and retrograde dilatation attempted. On May 24 operation was carried out with endobronchial anæsthesia. A long curved incision was made over the dorsum of the left hemithorax, commencing near the second thoracic spine and reaching the flank at about the tip of the ninth rib. A portion of the seventh rib was excised, and the diaphragm was incised to expose the stomach. The stomach was then freely mobilized by dividing the left gastric and the left gastro-epiploic vessels. The œsophagus was divided at its lower end and the cardiac opening closed. The œsophagus was freed from its bed up to the stricture, which was found to commence just above the arch of the aorta and to extend down for about two inches. A portion of the third rib was excised, and through that higher opening the strictured area was dissected out and the œsophagus brought over the top of the aortic arch. The fundus was brought up to the healthy portion of the œsophagus above the stricture and end-to-side anastomosis performed with interrupted cotton sutures. The fundus was fixed to the dome of the pleura with sutures, and the diaphragm was closed and sutured around the stomach. The lung was reexpanded and the chest was closed, an under-water seal drainage tube being left in the thoracic cavity. Transfusions were given throughout the operation, and the patient's post-operative condition was very good. The next day both main bronchi filled with mucus and fluid, and immediate bronchoscopy was necessary. After that the convalescence was satisfactory. Penicillin was given for the first three weeks. The wound healed with little trouble, and the patient was soon able to take semisolids. The diet was rapidly increased, and on the patient's discharge from hospital on July 4 he could eat a normal meal and was gaining weight. Since his discharge he had been very well and could now eat any food without difficulty. Post-operative barium meal examinations showed the stomach occupying a large portion of the left hemithorax, but very little lung tissue was showing. However, subsequent X-ray examinations had shown the lung to have reexpanded to a gratifying degree.

Papilloma of the Rectum.

DR. W. J. PULLEN presented a man, aged sixty-three years, who had been well until two or three years previously, when he had begun to notice the periodical passage *per rectum* of mucus and occasionally of blood. Rectal examination then revealed no abnormality. He was treated for colitis and hæmorrhoids. Over the past twelve months the passage of mucus had become more profuse, and occasionally the patient would pass up to a cupful of blood. Over the past few months he had occasionally had difficulty in opening his bowels and had begun to have the sensation of the presence of a lump. He had had no loss of weight. His general physical condition was excellent. Rectal examination revealed the presence of a very large villous papilloma occupying the upper half of the rectum. At operation on September 16, 1952, the tumour was found to have spread through the rectal wall, involving the peritoneum in the recto-vesical pouch. Dr. Pullen and Dr. T. E. Wilson had carried out a synchronous combined excision of the sigmoid colon and rectum. The patient's subsequent progress was uneventful, and he was discharged from hospital in four weeks. Since then he had put on a stone in weight. The pathologist reported that the specimen removed consisted of a portion of sigmoid colon and rectum containing a large, diffuse, polypoid growth just above the anal orifice. The growth was approximately five inches in diameter and two and a half inches in maximum height. Near the centre, the growth appeared to penetrate to the serosal wall. Microscopic examination showed that the tumour was mainly a villous papilloma.

Traumatic Perforation of the Colon.

Dr. Pullen's second patient was a stationmaster, who had been shot in a holdup about 12.45 a.m. on September 16, 1952. He had been admitted to the Saint George Hospital, where it was found that the wound of entrance was just above and about one and a half inches medial to the inguinal ligament. The wound of exit was just above the posterior superior iliac spine. It was considered probable that the bullet had just skirted below the peritoneal reflexion. However, some ten hours later his condition began to deteriorate, so laparotomy was decided upon. The bullet was found to have passed just above the peritoneal reflection and the inguinal ligament. The whole of the small bowel was examined, together with the descending iliac and pelvic portions of the colon, and the whole was found to be intact. A retroperitoneal hæmatoma was removed. A little blood clot was seen near the splenic flexure, and on closer inspection, after the greater omentum had been cleared away, two perforations were found well to the left in the left third of the transverse colon. Those were closed, and the abdomen was closed without drainage. The patient's subsequent progress was uneventful, and he was discharged from hospital in two or three weeks. Dr. Pullen said that the patient's main complaint at present was anæsthesia over the distribution of the left lateral cutaneous

nerve of the thigh. The nerve had been disrupted by the bullet. The interesting feature about the case was that a bullet wound which just nicked the peritoneum in the left iliac fossa should cause an injury to the transverse colon, which retracted almost under the left costal margin.

Bone Metastases from Breast Carcinoma Treated with Testosterone.

DR. A. L. WEBB showed a woman, aged forty-five years, who had been admitted to hospital in January, 1952, and had undergone left radical mastectomy for what was microscopically shown to be medullary carcinoma in the axillary tail of the left breast tending towards the scirrhous in type. Examination of lymph glands showed extensive malignant changes. In February the patient was readmitted to hospital with a history of six months' pain in the left hip and knee, becoming worse recently. X-ray examination showed extensive destruction with pathological fracture in the trochanteric region of the left femur. The condition was treated by means of a plaster spica with production of complete freedom from pain. In May, 1952, the patient was again admitted to hospital because of pain in her right shoulder. X-ray examination showed metastatic changes in the head of the right humerus and the glenoid cavity of the scapula. Treatment with testosterone commenced on May 19. One hundred milligrammes of testosterone propionate in oil were given intramuscularly three times per week. In addition, 20 milligrammes of methyl testosterone were given as sublingual tablets daily. By October 24, the fracture of the left femur appeared to be uniting, and the patient was allowed up in a walking caliper, being discharged from hospital on November 15, when testosterone therapy was suspended. Dr. Webb said that interesting features of the case were, firstly, the relief of pain in the right shoulder after two weeks of treatment (that appeared to coincide with the deepening of the patient's voice, although it was not until one month later that she herself complained of hoarseness of voice), amenorrhœa, and at about the same time, evidence of hirsuties, particularly the growth of hair on the patient's chin; and secondly, that monthly consultations had been carried on with the radiotherapy clinic at Sydney Hospital, together with progressive X-ray examinations, and deep X-ray therapy had been advised against, as the condition was apparently improving with testosterone therapy. The patient had had no radiotherapy for her bone metastases. Dr. Webb commented that the patient's case illustrated the beneficial effects of testosterone in metastases complicating breast carcinoma, even without deep X-ray therapy. There appeared to be a striking similarity between the effects of stilbœstrol in metastases from prostatic carcinoma and those of testosterone in metastases from breast carcinoma. There were certain accompaniments of the treatment—masculinity in various phases, *libido*, euphoria—and certain complications—uræmia and hypercalcæmia, a warning of the onset of which was given by headache, vomiting and reduced fluid output. The onset of those symptoms demanded immediate cessation of testosterone therapy. Possibly the best line of treatment would be by intramuscular injection of 100 milligrammes of testosterone propionate in oil daily for six to seven days a week, extending over two to three months. Then one should stop the treatment or maintain stability by sublingual administration of 20 milligrammes of methyl testosterone daily. Experience elsewhere favoured complete cessation of treatment after the three months' course, with resumption after three months' rest, as the effects appeared to be greater on resumption after complete cessation of therapy.

Tendon Transplantation for Radial Nerve Palsy.

DR. C. P. HUDSON presented a man, aged twenty-one years, who had been admitted to hospital in March, 1952, with severe and extensive injuries to the right arm, which had been caught in a machine at work. The patient had a large, lacerated wound in the lower third of the upper arm and upper third of the forearm on the lateral aspect. There was also a transverse wound on the dorsum of the lower third of the forearm. At operation, it was found that the elbow joint was exposed and the lateral epicondyle fractured with extensive muscle laceration in that region. The radial nerve was severely injured. Not only had it been severed, but a considerable portion had been removed. On the dorsum of the lower third of the forearm, the muscle bellies of some of the extensor muscles to the finger were protruding from the wound. Surgical cleansing and *débridement* were carried out, the remnants of the lateral epicondyle and all devitalized muscle were removed, and skin closure was obtained. A plaster of Paris splint was applied for five weeks, and then a "cock up splint" was used and physiotherapy instituted. When the patient had obtained full mobility of the wrist and fingers, tendon transplantation was carried out. On August 18, 1952, the *flexor carpi radialis* was transplanted into the radial extensors of the wrist. The *flexor carpi ulnaris* was inserted into the extensor tendon of the medial four fingers. The *palmaris longus* was inserted into the *abductor pollicis longus, extensor pollicis brevis* and *extensor pollicis longus* tendons. It was intended to use the *pronator teres* and to insert it into the radial extensors of the wrist, but it was found that it had been destroyed. Plaster of Paris splintage was then maintained for five weeks, being followed by reeducational exercises supervised by the physiotherapist, and the intermittent use of a "cock up" splint. At the time of the meeting, the patient was developing a reasonably useful right arm and was expected to resume light work at an early date.

Fractured Femur Treated with a Küntscher Nail.

Dr. Hudson then showed a male patient, aged twenty-two years, who had suffered a comminuted fracture of the left femur in a motor accident in August, 1952. He was brought to the Saint George Hospital from Berry in a Thomas's splint. As satisfactory reduction of the fracture could not be obtained, open operation was carried out. Internal fixation was obtained by means of a Küntscher intramedullary nail. The leg was suspended in a Hamilton-Russell apparatus for seven days to allow the patient to recover from the operative pain. He was allowed up on crutches ten days after the operation and discharged from hospital a week later. After satisfactory results were obtained from X-ray examination in November, 1952, eleven weeks after the operation, the patient was allowed guarded weight-bearing. Dr. Hudson said that the case illustrated the advantages of the method of treatment used, namely, (i) the short period of stay in hospital and of complete incapacity, (ii) the early recovery of full mobility in the knee joint, (iii) the minimal discomfort to the patient, and (iv) the probable shortened period of overall disability as a result of the accident. The disadvantages could be those associated with any operation on bone.

Fractured Clavicle with Unusual Displacement.

Dr. Hudson's last patient was a boy, aged twelve years, who had been thrown from a horse, which had then rolled on him, in October, 1952. He had suffered abdominal injuries and a fracture of the left clavicle. After he had recovered from the abdominal injury, for which laparotomy had been necessary, manipulation of the clavicle was carried out under general anæsthesia on November 3, 1952. On that occasion it was found that the displaced fragment could not be moved. One week later, after permission had been obtained to excise the fragment, an operation was carried out. The outer fragment, which consisted of approximately two-thirds of the clavicle, was found to be displaced at right angles to the normal position, so that its outer end was overlying the spine of the scapula. As it was found not feasible to replace the bone, it was excised. Very little, if any, disability was expected.

Botryoid Growth.

DR. A. M. MACINTOSH discussed the case of a girl, aged fifteen and a half years, who had suffered from a carcinosarcomatous polypus of the *cervix uteri*, a secondary seed growth from the vulva, and had died as the result of intraperitoneal metastases. She had been admitted to hospital as an "emergency" in February, 1952, with a history of retention of urine for ten hours. There was no history of any other abnormality, and all questions failed to elicit evidence of other abnormal symptoms. The patient's bladder had been catheterized prior to her admission to hospital. She had undergone the menarche at the age of fourteen years, and her menstrual periods, which lasted from four to five days, occurred at intervals of twenty-eight to forty-two days and were accompanied by no pain or discomfort. Examination of the abdomen revealed no abnormality, but vaginal examination revealed the presence of a creamy green infected mass visible at the vaginal orifice, which admitted only one finger. Further examination was carried out under general anæsthesia, and a large, friable, semi-necrotic infected mass was found filling the whole vagina and dilating it to fill the whole pelvis. No further details could be made out, and it was assumed that the mass arose from the *cervix uteri*. A biopsy was taken. At operation one week later, panhysterectomy was carried out with wide incision of the vaginal vault and removal of the tumour. Unfortunately, the tumour was so friable that it could not be

removed whole, and pieces fell off, soiling the peritoneum. Convalescence was somewhat stormy. It was pointed out that the small size of the vaginal orifice made it impossible to remove the tumour vaginally, and in view of later developments it would appear that the end would have been the same in any case. By the end of April, a small pedunculated polypus had grown where the hymen had been damaged at operation. It was a "seed growth". It was removed, and a very modified partial vulvectomy performed. A course of deep X-ray therapy was given at the Royal Prince Alfred Hospital. One month later, a secondary lump could be felt in the right iliac fossa, and by October 25, 1952, the patient was dead. The pathologist reported that the original tissue removed at operation consisted of the following: (*a*) The normal uterus with tubes and ovaries. (*b*) A tumour approximately four inches in diameter, one end of which was ragged, and half a cup of tumour fragments of varying size. The cut surface of the tumour had a variegated appearance consisting of hæmorrhagic cysts and myxomatous material. Microscopically, it was found to be composed of sarcomatous and carcinomatous structure; "carcinosarcoma" would appear to be a likely classification. The second specimen, the secondary "seed" of the vulva, was a polypoid piece of tissue, two centimetres in diameter, of similar microscopic structure to the carcinomatous areas seen in the original tumour. Dr. Macintosh commented that tumours of the type under discussion were very rare and very deadly. They consisted of carcinoma and sarcoma and might also contain embryonic tissue. They were then true teratomata. In view of the findings and subsequent course, together with the pathologist's report on the *cervix uteri*, Dr. Macintosh considered that if it had been possible to remove the tumour *in toto* or without trauma to the vagina, the result might have been different. If he ever met with one again, he would risk the possibility of hæmorrhage and remove the growth in small pieces *per vaginam* with the absolute minimum of trauma. The literature reported that in all cases the patients were dead within one year of diagnosis of the condition.

Dermoid Cyst of the Ovary.

Dr. Macintosh then showed a married woman, aged twenty years, who had been admitted to hospital in May, 1952, complaining of recurrent perineal and vaginal pain for a long time, which was becoming more frequent, dyspareunia for two months, in other words, ever since marriage, and a brown discharge *per vaginam* for two years. She had no frequency of micturition or dysuria. Examination of the patient revealed a general tenderness in the lower part of the abdomen, and on vaginal examination, a large tender mass was felt posteriorly and in the left fornix. X-ray examination revealed the presence of two teeth in the pelvis. At operation, a large dermoid cyst of the left ovary was removed.

Giant Serous Cyst of the Ovary.

Dr. Macintosh's next patient, a woman, aged fifty-six years, had first sought advice in September, 1952, for swelling of the legs, dyspnœa and scalding micturition. She had previously been treated for congestive cardiac failure. Examination of the patient revealed that she had a large abdomen, œdema of the legs and severe dyspnœa on exertion. The abdomen was symmetrically enlarged, with clinical signs of general ascites and complete dulness in both flanks. However, after much pushing and palpating, it was considered that the mass could be moved across from one flank to the other and a tympanitic note obtained to percussion. There were no abnormal signs in her chest. It was decided that nothing was to be lost by laparotomy. At operation, an enormous cyst of the right ovary containing 23 pints of fluid was removed. The cyst, which was approximately 12 inches in diameter, was found to be a serous cyst adenoma. The patient was now a new and very grateful woman.

Interesting Vaginal Cysts.

Dr. Macintosh displayed a number of vaginal cysts that had been removed. He considered that they were of interest for their varying positions, their symptomatology and their diagnosis. Because of their position and histological nature, he considered them all to be cysts of the duct of Gärtner. Discussing the associated anatomy and embryology, Dr. Macintosh said that the duct of Gärtner was synonymous with the Wolffian duct. The cysts might arise anywhere along the course of the duct from secretory activity of the epithelium. The cysts displayed had been found, respectively, in the broad ligaments, high up in the left fornix and left lateral vaginal wall, in the right antero-lateral vaginal wall midway between the introitus and cervix, and in the midline of the anterior vaginal wall just inside the introitus. The symptomatology and signs were illustrated by the histories of the four patients. The first patient, who was aged thirty-three years, had been admitted to hospital in June, 1952, in an acute emergency state, complaining of pain in the left side of the lower part of the abdomen for five days, of sudden onset and made worse by micturition and defæcation. She had been vomiting for two days. She had had four or five previous attacks. Her mentrual history was normal. She had had no children. She had undergone appendicectomy eleven years previously. On examination of the patient, the temperature and pulse were found to be normal. The abdomen was generally tender, with maximum tenderness in the left iliac fossa and considerable muscle guarding. Vaginal examination revealed a large, firm, fluctuant mass in the left and posterior fornices. At operation, a large infected cyst of the broad ligament was removed. The second patient, who was aged twenty-one years, had felt "something coming down in the front passage" since the birth of a baby twelve months before. Examination of the patient revealed a prolapsed, cystic swelling of the left lateral vaginal wall originating high up in the fornix. The third patient, a woman, aged thirty-five years, complained of dyspareunia and a feeling of something "getting in the way" and protruding from the front passage. Examination of the patient revealed the presence of a cystic swelling one and a half inches in diameter midway up the vagina on the right antero-lateral aspect. The fourth patient, a woman, aged thirty-five years, had complained of "something coming down in the front passage", which was much worse when she was pregnant. She also had recurrent pyuria, pyrexia and cystitis. Examination of the patient revealed the presence of a mid-line cystic swelling on the anterior vaginal wall, massage of which caused pus to escape from the urethra. The condition had been diagnosed as cystocele on more than one previous occasion. At operation, a smooth epithelium-lined cyst was found, which had at some time become infected and ruptured into the urethra. Dr. Macintosh said that the diagnosis of the conditions under discussion was from cystocele, prolapse of the vaginal wall, urethra or bladder, diverticula of the urethra or bladder, and vaginal inclusion cysts. Treatment was by removal by blunt dissection. The chief difficulty was that although the conditions started low down in the vagina, they might extend a long way up the course of the duct, making their complete removal difficult or damage to the ureters a possibility. In the first case discussed, the ureter had had to be dissected free from the lateral wall of the cyst. The pathological finding was one of a cyst with a smooth lining of cuboidal, columnar or even squamous epithelium and a fibrous outer wall.

(*To be continued.*)

FEDERAL MEDICAL WAR RELIEF FUND.

THE following correspondence is published at the request of the General Secretary of the Federal Council of the British Medical Association in Australia.

[COPY.]

BRITISH MEDICAL ASSOCIATION.

Tavistock Square,
London, W.C.1,
5th December, 1952.

Dear Dr. Hunter,

When Dr. Macrae was reading the minutes of your Federal Council held in August of this year he was particularly interested in the minute dealing with the Federal Medical War Relief Fund, but was troubled to see that you feel it necessary to make a further appeal to members for donations, thus showing that the fund is still needed in Australia.

In this country, as you know, we have a similar Medical War Relief Fund which has been able to give very considerable help to a large number of deserving cases and which, indeed, is continuing to assist cases, more particularly in giving grants towards the education of the children of doctors who were killed in the war or who have died owing to war service.

Yesterday there was a full meeting of the Medical War Relief Fund Committee and the minute of your Council was reported to it. The committee was unanimous in their desire to give some small token to you in recognition of the

wonderful help which was given not only to our Medical War Relief Fund but also to other medical benevolent funds here both in money and gifts during the war. I was, therefore, instructed to write to you to tell you that my committee agreed unanimously to send an immediate gift of £500 to the Federal Medical War Relief Fund in Australia.

I am writing by air mail in order that you may have this information as soon as possible. It would be helpful to me in making the necessary arrangements for the transfer of the money if you would let me know whether this is urgently needed, when we can send it immediately, or whether it can go through the ordinary arrangements.

May I take this opportunity of sending to your committee the best wishes of my committee and to yourself my greeting for Christmas and the New Year.

Yours sincerely,
(Sgd.) A. V. KELYNACK,
Assistant Secretary.

[COPY.]

FEDERAL COUNCIL OF THE BRITISH MEDICAL ASSOCIATION IN AUSTRALIA.

135 Macquarie Street,
Sydney,
15th May, 1953.

Dr. A. V. Kelynack,
Assistant Secretary,
British Medical Association,
British Medical Association House,
Tavistock Square,
London, W.C.1, England.

Dear Dr. Kelynack,

In his letter of 24th December, 1952, Dr. Hunter expressed on behalf of the Federal Council, the Trustees of the Federal Medical War Relief Fund and all the members of the Association in Australia sincere appreciation of the very generous action of the Medical War Relief Fund Committee in donating £500 sterling to the Federal Medical War Relief Fund.

The matter officially came before the Federal Council at its recent meeting, when it resolved that the Federal Council convey to the Medical War Relief Fund Committee the Council's gratitude and appreciation for its very generous action. I shall be glad, therefore, if you will kindly convey this resolution to your committee.

In advising you of this decision of the Federal Council I would like, as President, to express on behalf of the members in Australia very sincere appreciation of the action of the committee.

Yours faithfully,
(Sgd.) A. J. COLLINS,
President.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

THE PAYMENT OF MILEAGE.[1]

Colonial Secretary's Office,
9th July, 1855.

The Medical Adviser to the Government.

Sir,

I have the honour to acknowledge receipt of your letter of the 28th of last month reporting on an account of Mr. George F. Clarke for eight visits (at the rate of £1 1s. each) of eight miles distance to an ordinary constable who had broken his leg in the execution of his duty. In reply, I am directed to inform you that His Excellency the Governor-General has approved of the proposal made by you that in addition to the authorized fee of five shillings a visit, a mileage at the rate of one shilling over two miles should be allowed, with one guinea in cases requiring operations independently and that the acting auditor-general has been apprised accordingly.

I have, et cetera,
W. ELYARD.

[1] From the original in the Mitchell Library, Sydney.

Correspondence.

AMERICAN LIGHT ON VOLUNTARY HEALTH INSURANCE.

SIR: Your leading article on the American experience with voluntary health insurance will encourage the optimists and at least slow up the rate of head-shaking of the pessimists who say that socialization of the profession is inevitable.

Your article did not mention several important differences between the American medical benefit scheme and the Earle Page plan. They are:

1. Medical men in America take a leading part in the management of the Blue Cross and Blue Shield organizations. (The profession in Australia has been urged by our visitors to accept the challenge and do likewise.)

2. Medical benefits (100%) are paid only for hospital illnesses. (The Americans consider that the administrative overhead costs are far too high to justify payment on the comparatively small amounts involved in medical treatment in the home or surgery.)

3. The American doctors have a contract of service with the Blue Shield; that is, they work under a schedule of fees. (We were given the impression that the Americans regard this as an essential.)

4. No distinction is made between the general practitioner and the specialist benefit for any given service. (Again, the overhead cost of administering two schedules of payment seemed to be the important thing.)

5. The nature of the patient's illness is declared as a matter of routine, through the medium of a numerical code.

We do not have to copy American methods in all details, but all those concerned with evolving the Earle Page medical benefits scheme and making it work should note that the above items are all features of a large, vigorous and successful voluntary scheme which does work. As it stands, the Australian scheme will appeal as a better one—theoretically. It is for us to see that it does not founder on a high expense rate. To avoid this hazard may require modification of some of our fixed ideas.

Yours, etc.,
D. E. COPPING.

260 St. George's Terrace,
Perth,
May 18, 1953.

SIR: In your editorial in the issue of May 9, 1953, you commented on American light on voluntary health insurance.

The American scheme caters for those who need assistance most—those with preexisting disease. The cost of administration averages 8%, but varies between 5% and 25%; presumably this estimate excludes the cost of civil servants, who in Australia would implement the amount of government sympathy available for such schemes, and the costs of hospital secretaries' and nursing time spent in filling in forms.

The American scheme sounds better than ours. Their scheme has been in existence for twenty years. We have long admired the commercial perspicacity of the Americans. On the figures quoted, at least three-quarters of the American public refuse to avail themselves of the blessings offered them. Unless this anomaly can be explained, we would do well to hesitate before advocating any scheme based on American lines. It entails adding at least 8% to the real cost of hospitalization, even when run on efficient American lines, and the cost of hospitalization is high enough already.

Can any estimate be made of the cost to the taxpayer of employing the civil servants who may be regarded as a necessary additional cost to hospitalization under the secheme?

Yours, etc.,
T. LOVEGROVE, M.B.

Wongan Hills,
Western Australia,
May 18, 1953.

MASS RADIOGRAPHY SURVEY.

SIR: Dr. Bruce White sounded a very relevant note in his letter which appeared in your issue of May 16, 1953. In seeking the cooperation of the medical profession our association is keenly sensible of its own obligations to the profession.

We find ourselves in complete agreement with Dr. White concerning the choice of clinics and that the patient should be given the opportunity of seeing his own doctor. The primary object of our clinic is diagnostic and research, and it would not be practicable for us to offer treatment to the huge volume of patients passing through our mass radiography survey.

Our usual procedure, after the establishment of a diagnosis, is to ascertain the patient's wishes in regard to treatment and to refer the case to his own regular doctor.

Yours, etc.,

C. RUBINSTEIN,
Medical Director, Mass Radiography Division, Anti-Tuberculosis Association of New South Wales.

Crown and Foveaux Streets,
Surry Hills,
New South Wales.
May 21, 1953.

FATAL ANAPHYLACTIC SHOCK FROM PENICILLIN.

SIR: In your issue of May 16, 1953, is a reference to a case of fatal anaphylactic shock, supposedly due to procaine penicillin, 300,000 units. It may be of interest to your readers to know that in a 300,000 unit vial of procaine penicillin there are 120 milligrammes of procaine, more than enough to cause death. Martindale's "Extra Pharmacopœia" refers thus to the toxic effects of procaine: "Although procaine is the least toxic of all the local anæsthetics it sometimes causes systemic effects in hypersensitive patients and deaths have been reported from the injection of as little as 10 mg. Uncommon toxic effects are characterised by marked tachycardia and a 'feeling of impending death'. They can be relieved by 0·5 to 1 mg. neostigmine methylsulphate subcutaneously or intravenously." The usual symptoms of procaine poisoning as of poisoning by all local anæsthetics are mainly referable to the central nervous system. "There is excitement, confusion and headache; nausea, vomiting and abdominal pain frequently occur; the pupils are dilated; there is a rapid pulse and respiration becomes irregular. Delirium, convulsions and unconsciousness occur terminally and death results from respiratory failure. The course of acute cocaine poisoning is very rapid." There does not appear to be any necessity to postulate anaphylaxis in the case described by Higgins and Rothchild in *The New England Journal of Medicine* and quoted in your columns. The symptoms described are those of acute procaine poisoning. With increased use of procaine penicillin such reactions are bound to be met from time to time, and the practitioner using them should carry "Prostigmin" in his emergency kit as I do as the result of the following experiences.

A girl of six years (who had had procaine penicillin previously) developed acute *otitis media* and procaine penicillin, 300,000 units, was given. About twenty minutes later the mother recalled me and stated that the child had had a convulsion. She was semi-comatose with pulse rate of 160 but respirations unaffected. In hospital 0·1 milligramme of "Prostigmin" reduced the pulse to 120, and there was an uneventful recovery.

A man, aged fifty-six years, was given 400,000 units of procaine penicillin. He was suffering from severe arterial degeneration of the lower limbs and intermittent claudication and probably has a fusiform enlargement of his abdominal aorta. He became distressed within four minutes, and by the time I was contacted ninety minutes later he had auricular fibrillation with apical rate of 140 and pulse rate of 100. This was controlled by quinidine and digitalis and he returned to a regular rate in twenty-four hours. Presumably the procaine, by causing tachycardia, precipitated auricular fibrillation in his diseased heart. Incidentally when quinidine and digitalis were discontinued after seven days the fibrillation recurred.

When "anaphylaxis" appears to occur as the sequel to an injection of procaine penicillin, the use of a short-acting barbiturate intravenously is probably advisable, and if there is tachycardia of marked degree, "Prostigmin" could be life-saving.

Yours, etc.,

J. W. ARUNDELL.

409 North Road,
South Caulfield, S.E.8,
Victoria.
May 20, 1953.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MAY 2, 1953.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	4(1)	..	..	2(2)	..	..	..	6
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	2	..	2
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	1	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	3(2)	4(4)	1	..	..	..	..	..	8
Diphtheria	18(13)	4(4)	6(2)	..	4(2)	..	..	..	32
Dysentery (Bacillary)	..	..	..	13(1)	2(2)	..	..	..	15
Encephalitis	..	..	..	..	..	..	..	..	..
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	..	2(2)	..	..	3(2)	..	2	..	7
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	1	..	3(2)	..	..	..	..	..	4
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	1(1)	1(1)	..	..	..	3	1	..	6
Ophthalmia	..	..	..	..	24	..	..	..	24
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	25(9)	11(1)	9(3)	11(7)	..	4(2)	..	..	58
Puerperal Fever	1	..	..	..	..	..	..	..	1
Rubella	..	8(8)	..	..	4	..	..	..	12
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	16(7)	85(35)	2(2)	4(2)	2(2)	2(1)	..	..	111
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	3(2)	..	..	..	..	..	3
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	70(47)	18(8)	8(5)	10(6)	2(2)	3(1)	2	2	115
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	2	..	..	..	..	..	2
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Week-End Course in Pædiatrics.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that, in conjunction with the Institute of Child Health, a week-end course in pædiatrics will be held at the Royal Alexandra Hospital for Children, Camperdown, on Saturday and Sunday, September 5 and 6, 1953.

Lectures and demonstrations will be held from approximately 9.30 a.m. to 4 p.m. on each day, and the following subjects will be covered in the programme: surgery of the newborn; medical emergencies in the newborn; the problem of pyuria during infancy and childhood; the diagnosis and possible prevention of acute rheumatic fever; postural defects, feet and shoes; "funny turns" and their modern treatment; emotional problems in childhood; the treatment of sore throats, bronchitis and pneumonia; the general practitioner's approach to the problem of congenital heart disease; acute leuchæmia.

Fees for attendance are £3 3s., and early enrolment, with enclosure of remittance, should be made to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483. Telegraphic address: "Postgrad, Sydney."

Notice.

LAENNEC SOCIETY.

THE Laennec Society is holding a clinical meeting at the Royal Prince Alfred Hospital on Wednesday, June 24, 1953, at 8 p.m. All doctors interested in thoracic disease are cordially invited to attend.

Medical Prizes.

THE STAWELL PRIZE.

THE Stawell Prize, a memorial to Sir Richard Stawell, is open for competition. The amount of the prize is £30 (thirty pounds). The conditions are as follows:

1. The prize shall be awarded to the writer of the essay adjudged to be the best on a subject selected annually.
2. The subject for 1953 is "Use and Abuse of Antibiotics".
3. The dissertation should be based on personal observation and experience of the writer.
4. The competition is open to graduates of any Australian university.
5. The trustees reserve the right to withhold the award.
6. Essays must be delivered to the Medical Secretary, British Medical Association (Victorian Branch), by 4 p.m. on March 31, 1954.
7. Each essay must be typewritten or printed and must not exceed 75,000 words in length.
8. Each essay must be distinguished by a motto and must be accompanied by a sealed envelope marked by the same motto, containing the name and address of the author.
9. The trustees reserve the right to publish the prize essay.

Deaths.

THE following death has been announced:

GARDNER.—Hilda Josephine Gardner, on May 18, 1953, at Melbourne, Victoria.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Jefferis, Robert William, M.B., B.S., 1952 (Univ. Sydney), 37 John Street, Camden, New South Wales.

Hunter, Bruce Lowell, M.B., B.S., 1948 (Univ. Sydney), R.S.L. Building, Pulteney Street, Taree, New South Wales.

Diary for the Month.

JUNE 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JUNE 9.—New South Wales Branch, B.M.A.: Organization and Science Committee.
JUNE 12.—Queensland Branch, B.M.A.: Council Meeting.
JUNE 15.—Victorian Branch, B.M.A.: Finance Subcommittee.
JUNE 16.—New South Wales Branch, B.M.A.: Medical Politics Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.